

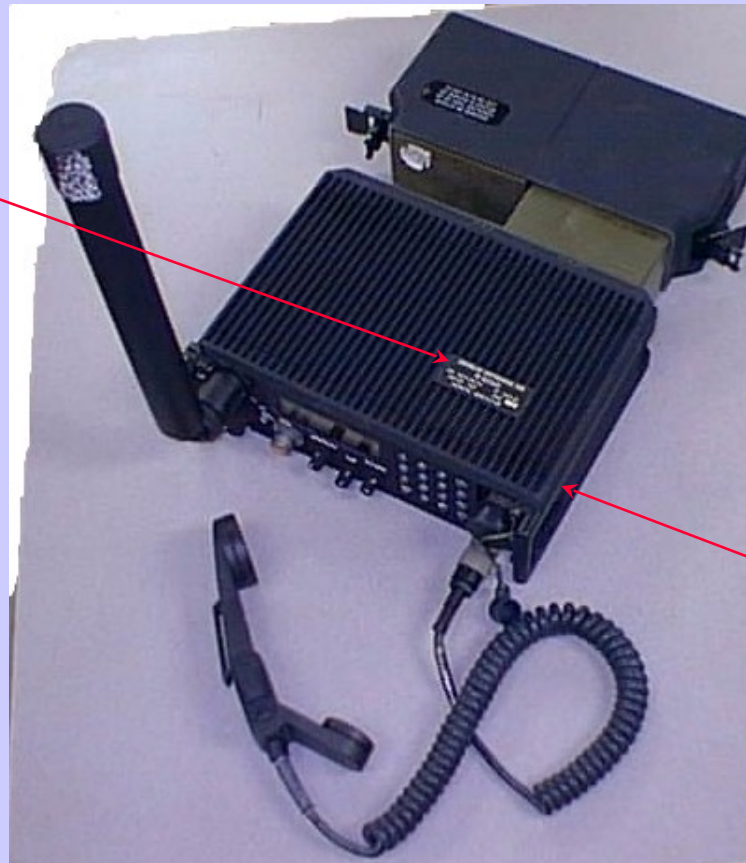
AN/PSC-5 Spitfire Operator Course

- **Welcome to
this course**

- **Prepared by: SCTS**
 - **MARINE CORPS**
 - **COMMUNICATIONS
ELECTRONICS**
 - **SCHOOLS**
- **29 PALMS CALIFORNIA**



AN/PSC-5 Radio Set and Ancillaries



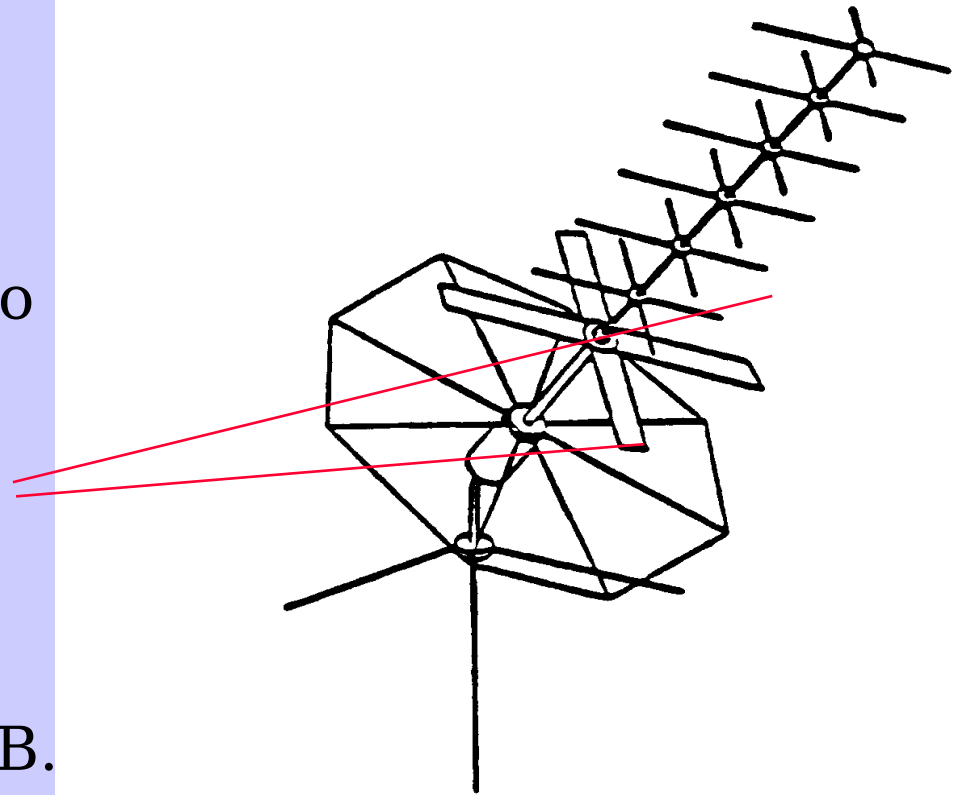
AN/PSC-5 Cable Set

Interface Cable	Function/ Interface	Length (ft.)	Weight (lbs.)
W1	KL-43C/F	6	0.41
W2	AN/PSC-2A	6	0.53
W3	DMDG	6	0.34
W4	PSC-5 Retransmit	27.5	3.03
W5	SINGARS Retransmit	27.5	1.72
W6	Satellite Antenna Cable	6	0.19



Satellite Antenna & Extension Kit (Issued with the AN/PSC-5)

- Base Element
 - Part Number AS-4326/P
 - Provides 6 dB gain
- Extension kit (includes two Extensions)
 - Part Number MK-2799/U
 - Each extension provides approximately 2.5 dB gain.
- Total Antenna Gain is 11dB.

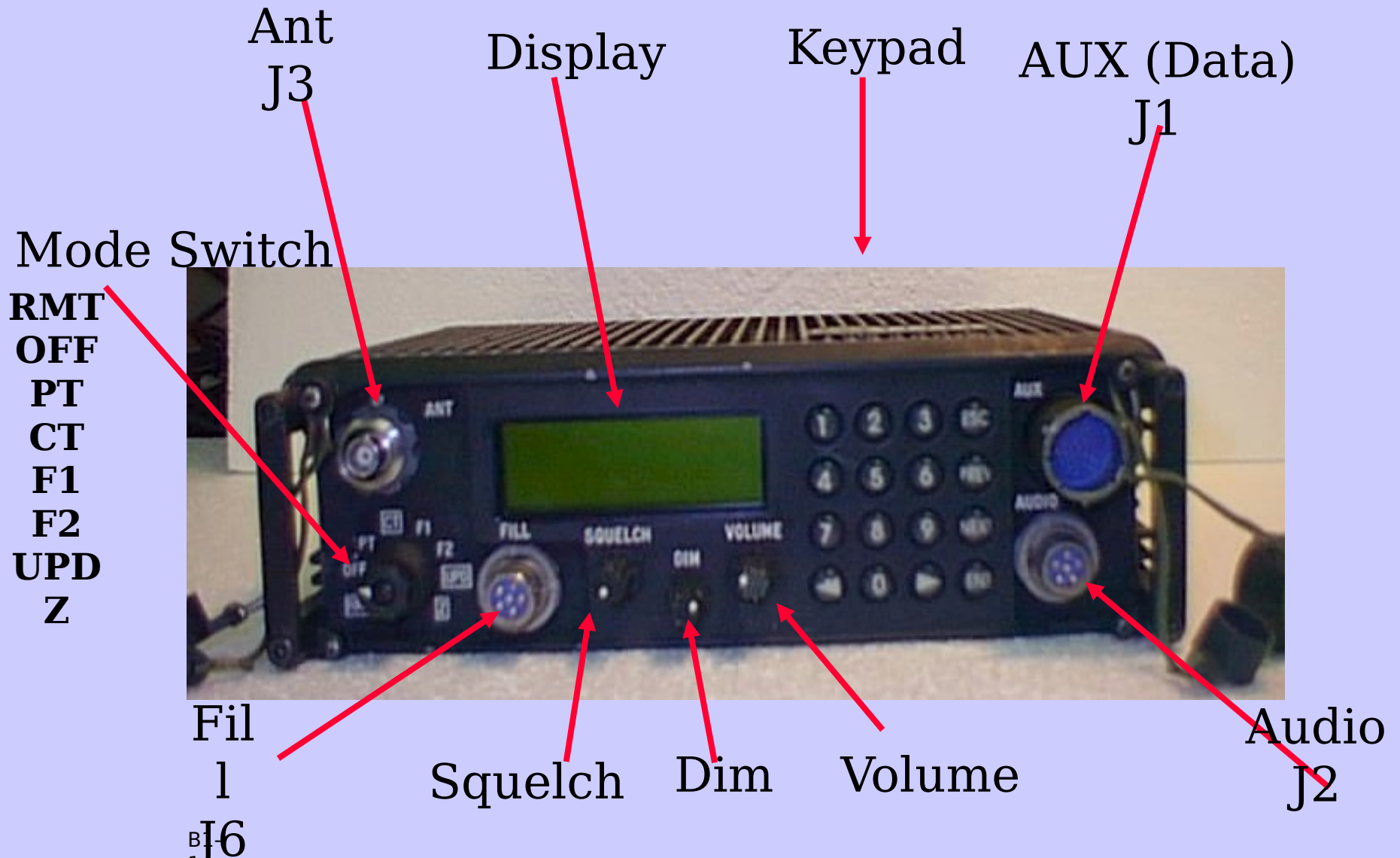


SATELLITE ANTENNA, AS-4326/P
WITH ANTENNA EXTENSIONS PARTS
KIT, ELECTRONIC EQUIPMENT,
MK-2799/U
(USER SUPPLIED)

Spitfire

Basic Operation

Front Panel View



Rear Panel View

**Battery
Connector
J4**

**Battery
Connector
J5**



AN/PSC-5

Capabilities & Features

- Menu-Driven Operation
- Internal Diagnosis (Built-In-Test)
- Embedded COMSEC
- Interoperability Features
- Preset Mode
- Memory
- Remote Control

Capabilities & Features

(continued)

- Operating Modes
 - LOS
 - Scanning
 - BEACON
 - SATCOM
 - Narrowband (5 kHz)
 - Wideband (25 kHz)
 - DAMA
 - 5 kHz
 - 25 kHz

Spitfire Characteristics

- Power Requirements:
 - Input Voltage is 21 to 32 Vdc (24 Vdc batteries)
 - Two BA-5590/U, BB-590/U, or BB-390/U
- Typical Power Consumption is 0.3 to 0.6 Amps Receive, 1.9 to 4.25 Amps Transmit.
 - Current consumption dependent upon mode of operation.
- Warm-up Time:
 - 30 seconds after turn-on (approximately 10 seconds when BIT is aborted).

Spitfire Characteristics

(continued)

- LOS Frequency Ranges
 - » 30.000 - 87.975 MHz
 - » 116.000 - 173.975 MHz
 - » 225.000 - 399.975 MHz
- SATCOM Frequency Ranges
 - » 225.000 - 399.995 MHz
- DAMA Frequency Ranges
 - » 225.000 - 399.995 MHz

Spitfire Characteristics

(continued)

- Channel Spacing
 - » 25 kHz (LOS)
 - » 5 kHz and 25 kHz (SATCOM/DAMA)
- Channel Presets
 - » LOS (6)
 - » SATCOM (6)
 - » DAMA (6)
 - » BEACON (1)

Spitfire Characteristics

(continued)

- Transmitter Power Output
 - SATCOM and DAMA
0.18 to 18 Watts ± 2 dB, adjustable in 1dB steps
18 Watts minimum between 290 to 320 MHz
 - LOS AM
0.25 to 5.0 Watts -0, +2 dB, adjustable in 1dB steps
 - LOS FM
0.18 to 9.0 Watts ± 2 dB, adjustable in 1dB steps

Spitfire Characteristics

(continued)

- Selectable
 - Amplitude Modulation (AM)
 - Frequency Modulation (FM)
- Non-selectable
 - FM-Frequency Shift Keying (FM-FSK)
 - Shaped Binary Phase Shift Keying (SBPSK)
 - Shaped Offset Quadrature Phase Shift Keying (SOQPSK)
 - Binary Phase Shift Keying (BPSK)
 - Differentially Encoded Quadrature Phase Shift Keying (DEQPSK)

Spitfire Characteristics

(continued)

- Temperature
 - Operating Temperatures: -30 to +55degrees C/-22 to 131degrees F
 - Storage Temperature: -45 to +75 degrees C/-49 to 167degrees F
- Size and Weight
 - RT
 - Width: 10.56 in. x Depth: 8.13 in. x Height: 3.26 in.
 - Weight: 10.64 lbs.
 - Battery box
 - Width: 10.56 in. x Depth: 4.87 in. x Height: 2.92 in.
 - Weight: 1.3 lbs. (without batteries)
 - LOS Antenna
 - Height: 14.0 in. x Diameter: 1.38 in.
 - Weight: 0.7 lbs.

Spitfire Characteristics

(continued)

- AS-4326/P Satellite Antenna
 - Foldable, manpack antenna
 - 6 dB gain (240 to 400 MHz)
- Two antenna extension arrays with each array providing approximately 2.5 dB of RF gain
- Weight: 2.5 lbs (with extensions)

Installation of Batteries

- Ensure the RT is off.
- Place the RT face down.
- With the Battery Box removed, Insert the batteries onto the connectors on the rear of the RT.
- Place the Battery Box over the batteries and latch the drawhooks.

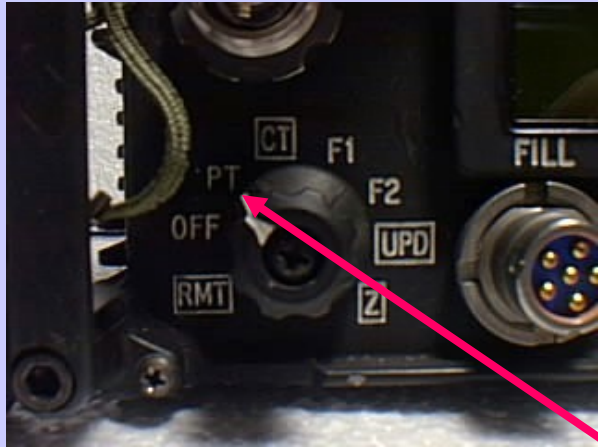


Connection of H-250/U Handset

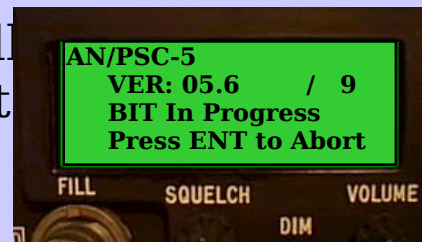
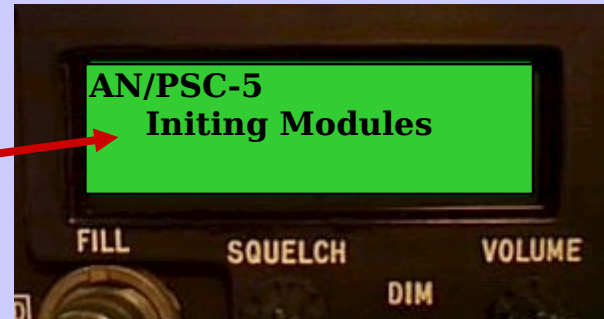
- Align the Handset connector key with the RT key (orange dot or flat side with a dot).
- Insert the handset connector, and turn clockwise until it is locked into place.



BIT & Menu Opt

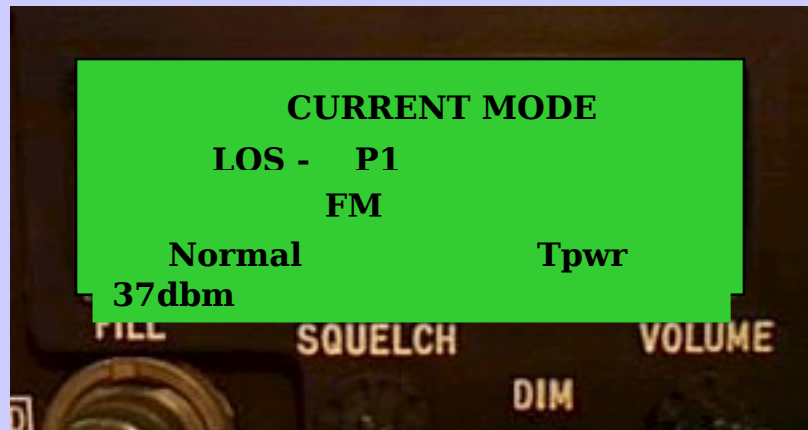


- Set the mode switch to the PT Position.
 - The RT will display the “Initializing Radio” message for about two seconds.
 - When selecting PT, CT, F1, or F2 after turning power on or zeroization, the “Initing Modules” message will appear for one second or less.
- During Power-Up BIT, the display will alternately show a checkerboard test pattern and display the latest software version.



Power-Up, BIT & Menu Options (continued)

- After about 30 seconds, the Power-Up BIT will be completed.
- The display will show the last active unmodified mode before power was removed.
- The AN/PSC-5 is ready for operation.



(Screen shown in PT mode.)

Installation of LOS Antenna

- Observe Warnings on page 3-6 of the operator's TM.
- Loosen the friction ring on the LOS antenna.
- Connect the LOS antenna to the RT ANT Connector by turning fully clockwise until the antenna is loosely attached.
- Position the antenna to the angle desired and tighten the friction ring.



Battery Status Messages

- When using used batteries, the display may show the low battery warnings.
- If this does occur on new Lithium batteries, perform the procedure described in the TM -12&P, paragraph 3.22 (BA-5590 Battery Pre-Conditioning). Otherwise, the batteries are discharging normally.

Status Msg 1 of 10
Batteries Low
Less than 22 Volts

Status Msg 2 of 10
Batteries Very Low
Less than 21 Volts

Batteries Depleted
Operation Suspended
Replace Batteries

Battery Pre-Conditioning

- ESC to the Main Menu.
- Disconnect Antenna
- Press key 4 (BIT Options Menu) and then key 6 (battery Level).
- Key the Handset (PTT).
 - The observed voltage level may fall to a low point & begin to climb.
 - If a Battery Warning Message is observed, press the ESC key to clear the message.
 - When the voltage = 24 Volts, release the PTT switch.
 - The voltage should begin to climb up to 27 Volts.

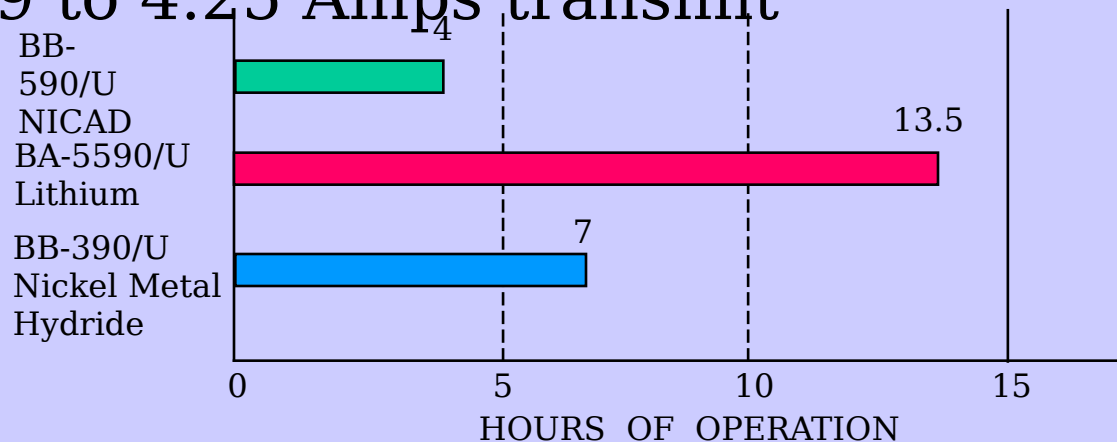
BATTERY LEVEL

24.2 Volts

- Rekey the PTT:
 - If the voltage drops below 24 Volts, repeat steps (a - c).
 - If the voltage = 24 or more, the batteries are ready for Operation.
 - if the voltage does not climb, the batteries must be replaced.

Power Consumption

- Receive/Transmit ratio of 8:1.
- Typical Consumption
 - 0.3 to 0.6 Amps receive,
 - 1.9 to 4.25 Amps transmit



Keyboard

Basic Navigation

- ESC
- ENT
- PREV
- NEXT
- ARROWS
- HOT KEYS



System Menu Options

To be discussed later



HOT Key #4



HOT Key #5

MAIN MENU

1. - CURRENT MODE
2. - DATABASE OPTIONS
3. - SET PRESETS
4. - BIT OPTIONS
5. - MAINTENANCE

System Menu Options

(BIT Options)

Terminal BIT HOT Key #1

- Remove the antenna, external cables, and other devices.
- Set the Mode switch to PT.
- BIT will take approximately 30 seconds to complete.

BIT OPTIONS

1. - Terminal BIT
 2. - SATCOM Loopback
 3. - Data Loopback
-
4. - Display Test
 5. - Keypad Test
 6. - Battery Level

System Menu Options

(BIT Options)

Terminal BIT

- **Successful:**

- The screen returns to the BIT OPTIONS Menu.

- **Unsuccessful:**

- The screen will indicate the areas in which the fault may exist.
- Possible faults are listed in the order of most to least probable.

BIT OPTIONS

1. - Terminal BIT
2. - SATCOM Loopback
3. - Data Loopback

BIT FAULT:

256

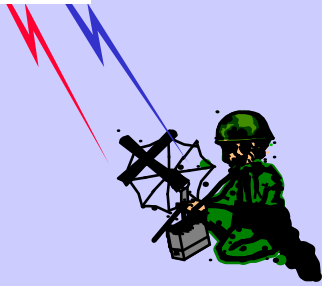
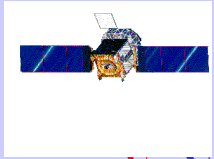
- 1 -
- 2 - TXDRV
- 3 - TX

System Menu

Options (BIT Options)

BIT Fault Codes

BIT Fault Code	Faulted Module Name	Faulted Module
1	PANEL	Front Panel Assembly
2	CTRLR	Controller
3	SYNTH	Synthesizer
4	RF/IF	RF/IF Converter
5	TXDRV	Transmitter Driver
6	TX	Transmitter
7	COMSC	COMSEC
8	MODEM	Modem
B	PWREG	Power Regulator
0		Place holder; not a fault code



System Menu Options (BIT Options)

Satellite Loopback

- The display will show the current selected satellite channel.
- With the cursor on "SEND", press the ENT key to run the Satellite Loopback test.
- The result may be within the range 0 to 255, or fail.
- A good range is 100 to 255.



HOT Key #2

SATCOM LOOPBACK
Channel Number: ###
{SEND}

SATCOM LOOPBACK
Executing Test

SATCOM LOOPBACK
Test Successful
RSS 125

SATCOM LOOPBACK
Test Failed

System Menu Options

(BIT Options)

- The Data Loopback test may be performed anytime a full duplex data device (PC) is attached.
- The Data Loopback test is performed using Plain Text (PT) encryption.
- The data device input is echoed back to the data device.
- Purpose of the Data Loopback Test is to check:
 - I/O of the RT.
 - The interface cables.
 - For a defective data device.

Data Loopback



HOT Key
#3

DATA LOOPBACK

Enable
d

System Menu Options

(BIT Options)

- The Display Test runs when selected from the BIT Options Menu without operator intervention.
- Pass/Fail is determined by the operator based on the observed patterns.

Display Test



HOT Key

#4

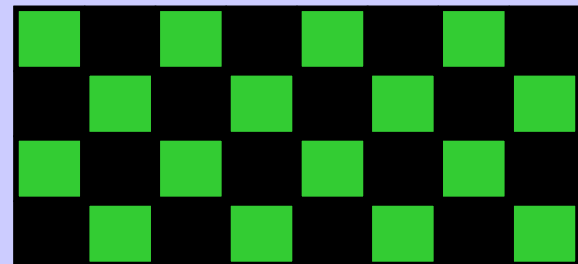
AN/PSC-5

VER: 05.6 / 9

BIT In Progress

Press ENT to Abort

The display will alternate between these screens.



System Menu Options

(BIT Options)

- Use to verify the keypads functionality.
- Observe the “Last Key” line for proper key results.

Keypad Test



HOT Key
#5

KEYPAD TEST
Press ESC to End

Last Ke

System Menu Options

Keypad Test (continued)

- Keypad Results

Keypad Key depressed	Displayed Result
1	ONE
2	TWO
3	THREE
4	FOUR
5	FIVE
6	SIX
7	SEVEN
8	EIGHT
9	NINE
0	ZERO
←	LEFT
→	RIGHT
PREV	PREV
NEXT	NEXT
ENT	ENT
ESC	Returns to BIT OPTIONS menu

System Menu Options

(BIT Options)

Battery Level Check

- The lowest possible operating voltage is 21 volts DC.
- The RT is likely to shut down when transmission is attempted at 21 volts.



HOT Key #6

BATTERY LEVEL

24.2 Volts

System Menu Options

Maintenance Menu



HOT Key #5

MAIN MENU

- 1.- CURRENT MODE
- 2.- DATABASE OPTIONS
- 3.- SET PRESETS
-
- 4.- BIT OPTIONS
- 5.- MAINTENANCE

MAINTENANCE

- 1 - Review BIT Results
- 2 - Erase BIT Results
- 3 - Filter Tuning
-
- 4 - I/O Device Setup
- 5 - Erase Presets
- 6 - Display Versions

System Menu Options

(Maintenance Menu)

Review BIT Results - HOT Key #1

- Displays the last 10 faults & consecutive occurrences (up to 99).
- Includes the % of Non-Volatile Memory (NVM) used.

REVIEW BIT RESULTS	
0-356:01	1 350:20
2-	3-
4-	5-
<hr/>	
6-	7-
8-	9-
Percent NVM Used: 30	

System Menu Options

(Maintenance Menu)

Erase BIT Results



HOT Key #2

ERASE BIT RESULTS
ENTER to Confirm
ESC to Exit

System Menu Options (Maintenance Menu)

- Filter Tuning is performed by a DS Maintainer ONLY.
- Filter Tuning is to be Performed whenever the following modules are replaced:
 - Controller
 - Transmitter Driver
 - RF/IF module

Filter Tuning



HOT Key #3

FILTER TUNING

PRESS KEY TO BEGIN

FILTER TUNING

IN PROGRESS

FILTER TUNING

COMPLETED

System Menu Options

(Maintenance Menu)

- I/O Device Setup is required for some external data devices.
- The default settings are for Positive Data and Clock.

I/O Device Setup



HOT Key #4

I/O DEVICE SETUP

DATA: POSITIVE

CLOCK: POSITIVE

System Menu Options

(Maintenance Menu)

Erase Presets



HOT Key #5

ERASE PRESETS

{ERASE}

System Menu Options

(Maintenance Menu)

Display Versions



HOT Key #6

Status Mscr	2	of	10
Software Versions			
CTLR: 0580	Mdm:	9	
BP: 4. 3			02

COMSEC Operations

AN/PSC-5

Embedded COMSEC

- ANDVT

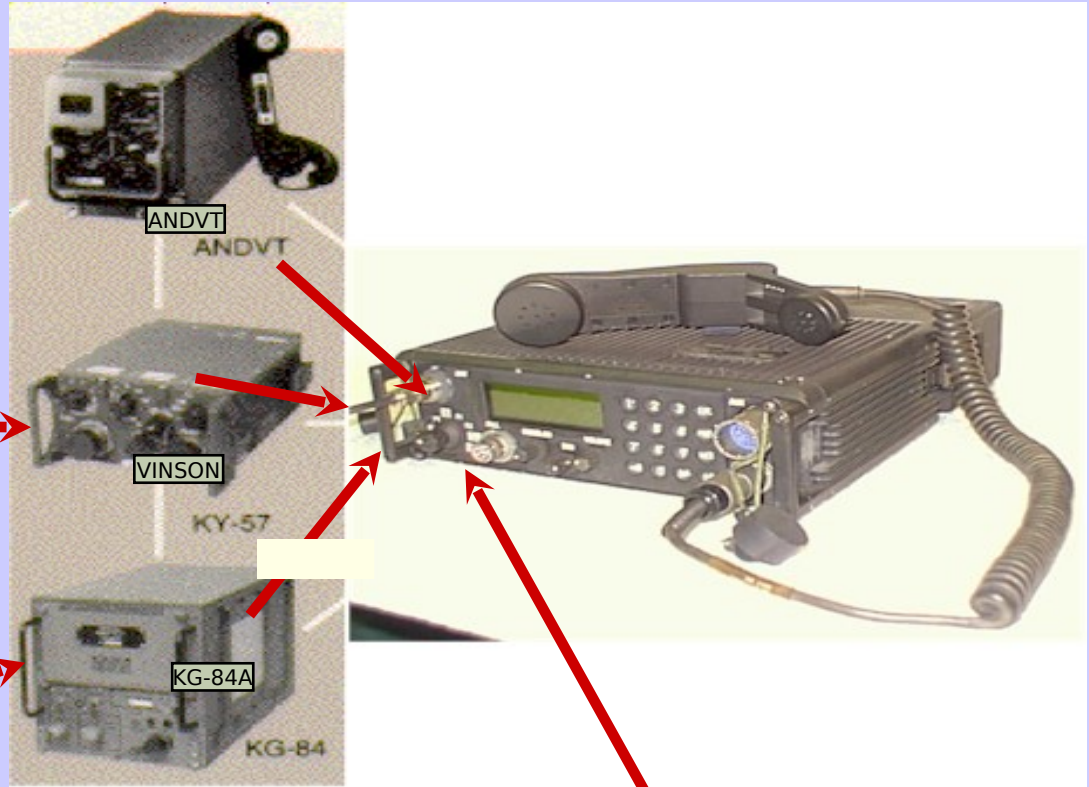
- KY-99, KY99A
- KY-100
- USC-42

- VINSON

- KY-57
- KY-58
- KY-99A

- KG-84A

Mode 4



KGV-11 (Orderwire
Encrypter)

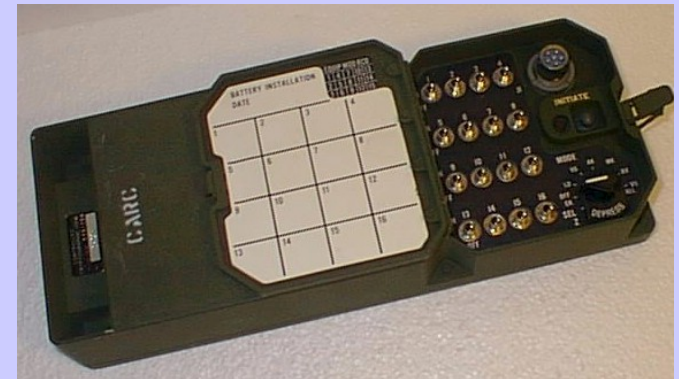
COMSEC Fill Devices



TSEC/KOI-18



TSEC/KYK-13



TSEC/KYX-15

AN/CYZ-10



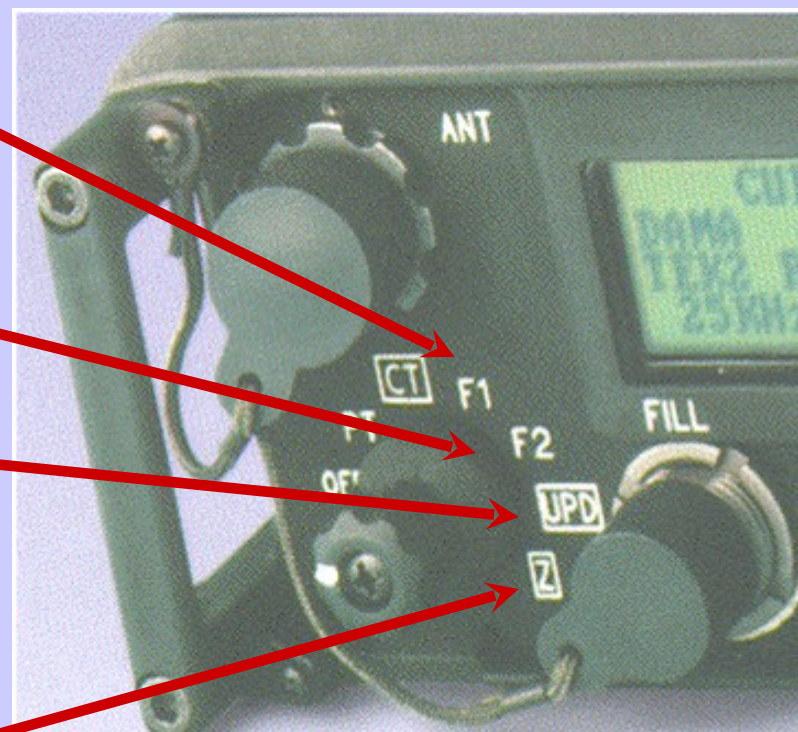
Using the AN/CYZ-10

- Initialize
- Load keys
- Fill AN/PSC-5



COMSEC Positions

- F1 Position
 - to load TEK & KEK
- F2 Position
 - to load Orderwire keys
- Update
 - to roll up key state (255 possible)
- Zeroize
 - Clears all Keys



TEK and KEK Fill Procedure (F1 Position)

NOTES:

- Do not connect Fill device before Power-Up BIT has completed
- When rotating the mode switch, remember it must be pulled outward as it is turned clockwise



TEK & KEK Key Fill Procedure (F1 Position)

- When the Initialization screen appears, press the ENT key twice; the number in the lower right corner will increment from 1 to 2.
- This screen appears.
 - a. Connect the Fill device.
 - b. Select # using RT key pad and press the ENT key.
 - c. Select Encryption type (ANDVT, VINSN, or KG-84) and press the ENT key.
 - d. Disconnect the KOI-18 or turn off the KYK-13 fill device.
- If the load was successful, this screen will appear.
- Repeat steps a through d for each key required.

**COMSEC Randomize
Proceed to F1 and
Press ENT Twice**

(0)

F1: COMSEC

COMSEC Key: 1


Key Type: VINSN

**F1: COMSEC
Key Filled**

COMSEC Key: 1

Key Type: VINSN

Checking Key States

- ESC to Main Menu.
-  **Use Hot Keys #2 & #7.**
- The COMSEC Key State screen appears.

COMSEC KEY STATES		
KEY	TYPE	UPDATE
1	ANDVT	0
2	VINSON	0
3	NO KEY	
4	NO KEY	
5	NO KEY	
OTAR		0

COMSEC Key Update Procedure

NOTE:

- When rotating the mode switch, remember it must be pulled outward as it is turned. Take care not to go past the UPD position to “Z”; otherwise, the radio will Zero out all the keys



COMSEC Key Update Procedure

- Upon entering the Update position, this screen will appear.
- Depress the key pad # that corresponds to the key # desired to update; then press the ENT key.
- To confirm your update:
 - Rotate the mode switch to CT.
 - Press the ESC key to access the Main Menu.
 - **Use HOT key #2** (Database Options).
 - **Use HOT key #7** (COMSEC Key States).
- If more than one update is required, verify the update count before proceeding back to the Update mode switch position.

COMSEC KEY UPDATE

COMSEC Key: 1
Key Type: VINSN
Update: 005

COMSEC KEY STATES

KEY	TYPE	UPDATE
1	ANDVT	1
2	VINSON	5
3	KG84	0
4	NO KEY	
5	NO KEY	
OTAR		

Over-The-Air Rekey (OTAR)

- For the AN/PSC-5 to receive an OTAR, at least 1 TEK and the KEK must be loaded
- When the RT receives an OTAR two variations are possible:

COMSEC KEY STATES		
KEY	TYPE	
1	ANDVT	0
2	VINSON	0
3	NO KEY	
4	NO KEY	
5	NO KEY	
OTAR		

Status Msg ____ of ____
ANDVT OTAR
DETECTE
D

OR

Status Msg ____ of ____
VINSON
DETECTE
D

To check OTAR state:

- ESC to Main Menu
- Hot Key #2 & #7**
- The COMSEC Key State screen appears, reflecting the updates.



COMSEC KEY STATES		
KEY	TYPE	UPDATE
1	ANDVT	0
2	VINSON	0
3	NO KEY	
4	NO KEY	
5	NO KEY	
OTAR		1

Orderwire Key Fill Procedure (F2 Position)

NOTES:

- In order to complete the Fill 2 procedure, the Fill 1 procedure should be completed first.
- Be careful not to rotate past the F2 position.



Orderwire Key Fill Procedure (F2 Position)

- Once the mode switch is placed into the F2 position, the RT will initialize the COMSEC module for loading.
- Unlike TEK/KEK, Orderwire keys the fill device does not need to be turned off.
- From this screen:
 - a. Press 1 on the key pad.
 - b. Press the ENT key (enables RT to receive the keys).
 - c. As each key is filled, the associated number will be displayed.
 - d. Repeat steps a through c to load all required Orderwire key. You may use the same key or different keys at each position.

**Initializing
Modem for
Key Fill**

F2: Orderwire

Keys: _____

Load:

1

**F2: Orderwire
Key Filled**

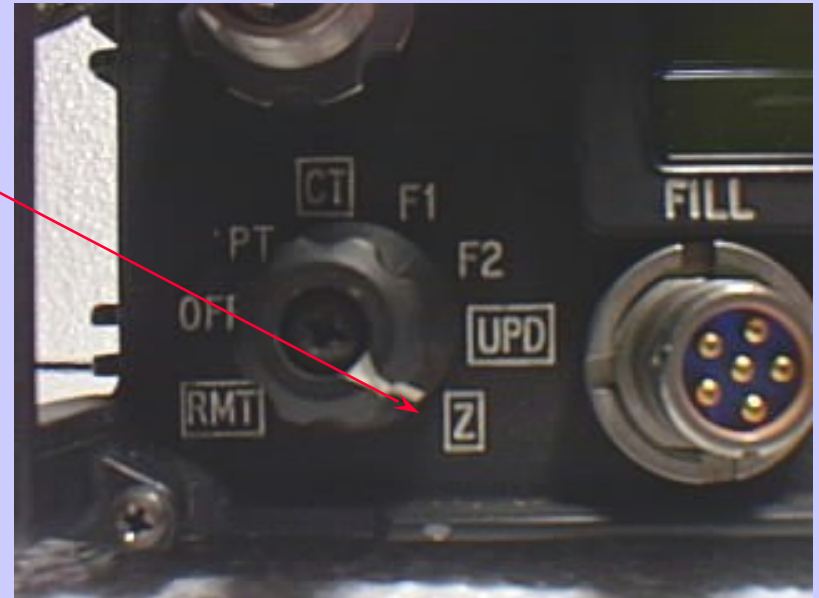
Key 1

Load:

1

Zeroize Procedure ("Z" Position)

- **NOTE:** When rotating the mode switch remember it must be pulled outward as it is turned to position "Z."
- ALL keys are erased.
- The Zeroizing period is instantaneous.



Line-Of-Sight (LOS) Operation

LOS Cut Sheet

Example

LOS PRESETS							
Parameter	Value			Presets			
		1	2	3	4	5	6
Modulation	AM						
	FM						
Encryption	VINSON						
	KG-84						
Comm	Voice						
	Data						
Variant	Normal						
	Scan						
Tpwr (dbm)							
Rx Freq							
Tx Freq							

COMSEC

KEY NUMBERS	1	2	3	4
FILL TYPES	VINSON	ANDVT	KG-84	KG-84
UPDATES	0	2	1	4

5
ANDVT
5

Line Of Sight Presets

- From Main Menu



se **Hot Key**
#3.

- The RT provides 6 Presets for LOS (P1-P6).
- Each Preset represents a complete RT setup (except TEK #).

Set Preset	
LOS - P#	
FM VINSON V16K	
Normal	Tpwr 37db
R ###.###	T ###.###

- The Data Rate will only be displayed when the Mode switch is set to CT.

LOS Operation



- From the Current Mode screen; select LOS.
- Select desired Preset (1-6).
- If Mode switch is CT
 - assure TEK # (1-5) is selected according to Key position.
 - the AN/PSC-5 is ready for communications.
- If Mode switch is PT
 - the AN/PSC-5 is ready

CURRENT MODE

LOS - P# **Sα- - 024**

TEK # FM VINSON V16K

Normal **Tpwr 37dbm**

R ####.#### **T ####.####**

LOS Operation

- Transmit

- Depress the PTT switch and the Current Mode screen will reflect:

- The Transmitter is activated (Tx)
- Communications is PT or CT
- Transmit level

CURRENT MODE
LOS - P1 Tx-CT-125
TEK1 FM VINSN V1
Normal Tpwr 37

- Receive

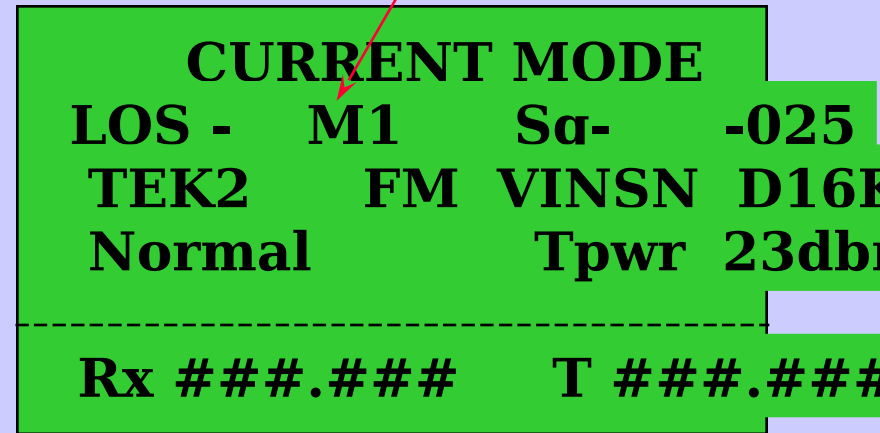
- When receiving a valid communications (squelch broken), the display will reflect:

- Rx
- Communications is PT or CT
- Receive signal level

CURRENT MODE
LOS - P1 Rx-CT-045
TEK1 FM VINSN V1
Normal Tpwr 37

Modifying Current Mode (LOS)

- The following items may be modified:
 - TEK #
 - Modulation
 - Encryption Type
 - Data or Voice
 - Normal/Scan
 - Tpwr 23 to 38 or 39 dBm
 - Tx or Rx Frequency
- If any field (except PRESET) is changed on the Current Mode menu, the Preset letter “P” will change to “M” for Modified.



CURRENT MODE

LOS -	M1	Sa-	-025
TEK2	FM	VINSN	D16E
Normal		Tpwr	23dbm

Rx ####.#### T ####.####

Load Scan Presets

- ESC to Main Menu

-  **Hot Key**
#3

- In order for Scanning to work, 3 LOS Presets must be configured

- P1 Frequency set 1
- P2 Frequency set 2
- P3 Scan P1/P2

Set Preset			
LOS - P1			
FM	VINSN	V16	
Normal	Tpwr 37dbm		
R 350.000		T 350.000	

Set Preset			
LOS - P2			
FM	VINSN	V16	
Normal	Tpwr 37dbm		
R 350.500		T 350.500	


Set Preset			
LOS - P3			
	V		
Scan	Tpwr 37dbm		
R 350.000		T 350.500	
Rx 1, 2		Tx 2	

Scan Operation

- Reception is performed on two independent frequencies (Presets 1 & 2).
- In the example shown here, transmissions are always directed to Preset 2 (Tx is set to 2 which is 350.500 MHz).
- If Preset 3's Tx is set to 0, the RT will automatically tune its transmit on the last received frequency.

CURRENT MODE			
LOS	- P3	Sq-	-025
		V	
Scan		Tpwr	37dbm
<hr/>			
R	350.000	T	350.500
Rx	1 , 2	Tx	2

Set Beacon Presets

- **ESC to Main Menu.**
-  **Use Hot Key #3.**
- Change mode field to **BEACON**.
- **Note: There is only 1 Beacon Preset.**
- The only changeable fields are Frequency & Modulation (AM/FM); however, modulation depends on the selected frequency.

Set Preset	
BEACON	
T ###.###	
FM	Tpwr 43dl

BEACON Operation


- **WARNING:** Keep away from the antenna and do not touch the RT case while in BEACON mode. In BEACON Mode, you are transmitting (near 20 watts) and the RT will get hot.
- At the Current Mode screen, change mode to BEACON.
- When the ENT key is pressed, the RT will go into Beacon Mode and begin to transmit continuously.
- While transmitting, the RF is modulated with a tone sweeping from 150 to 3850 Hz.

CURRENT MODE
LOS - P3 **Sq- -02**
FM
Normal **Tpwr 37dbm**

CURRENT MODE
BEACON **Tx - 123**
T 245.000
FM **Tpwr 43dbm**

SATCOM Operations

Load SATCOM Presets

- **ESC to the Main Menu.**  **Use Hot Key #3.**
- The RT provides 6 Presets for SATCOM (P1-P6).
- Each Preset represents a complete RT setup (except TEK #).
- Data rates below 16K require a preamble (AN/PSC-5).

25 kHz WideBand

```
SET PRESET
SATCOM - P#
      FSK  VINSN  V16K
Normal      Tpwr 43dbm
-----
Channel Number: ###
Rx ###.###      T ###.###
```

5 kHz NarrowBand

```
SET PRESET
SATCOM - P#
      PSK  ANDVT  V2400
Normal      Tpwr 43dbm
-----
Channel Number: ###
Rx ###.###      T ###.###
AN/PSC-5      DIFF
```

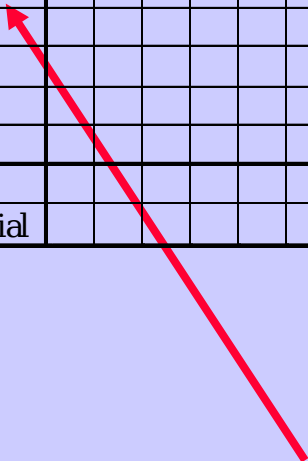

SATCOM Cut Sheet

Example

Parameters	Value	PRESETS					
		1	2	3	4	5	6
Encryption	Vinson						
	Kg-84						
	ANDVT						
Comm	Voice						
	Data						
Data Rate	1200						
	2400						
	9600						
	16K*						
Modulation	AM (Pwr 23 to 38)						
	FM (Pwr 23 to 39)						
Channel #	9 to 239 +999						
Rx Freq.	If 999, enter Downlink Freq.						
Tx Freq.	If 999, enter Uplink Freq.						

Parameters	Value	PRESETS					
		1	2	3	4	5	6
Preamble	PSC-5						
	USC-42(V)						
	PSC-3						
	VSC-7						
	LST-5B/C						
	MST-20						
	URC-110						
	WSC-3						
Encoding	DIFFerential						
	Non DIFFerential						

Most Robust



COMSEC

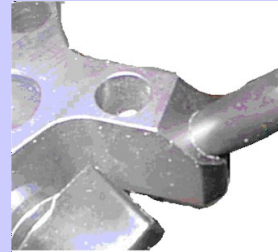
KEY NUMBERS	1	2	3	4
FILL TYPES	VINSON	ANDVT	KG-84	KG-84
UPDATES	0	2	1	4

5
ANDVT

5

Satellite Antenna Installation

- Open the case and remove the antenna.
- Release the leg strap.
- Pull out and swing the tripod legs into receptacles.
- Set the antenna on the ground.



WARNING

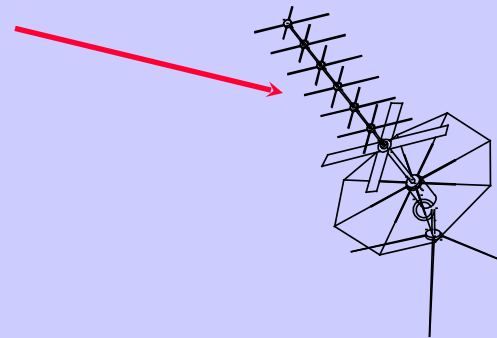
Satellite antenna dipole elements are spring loaded. Release elements away from immediate personnel.

- Press down on locking ring and release the 4 dipole elements.



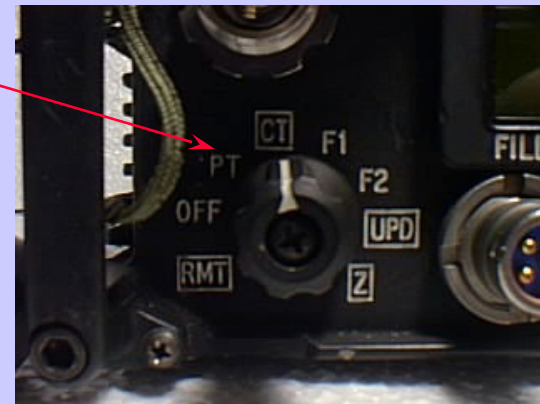
Satellite Antenna Installation

- Open the eight telescoping ground plane arms.
- Connect the W6 cable from the antenna to the ANT connector on the AN/PSC-5.
- Install the antenna extensions.
- Align the antenna extensions.



SATCOM Operation

- Set the Mode Switch to CT.
- Adjust the Volume and DIM controls as necessary.
- Verify the following are selected:
 - SATCOM
 - required Preset #
 - required TEK #



WideBand (25 kHz)

CURRENT MODE
SATCOM - P1 Sα- - 0
TEK 1 FSK VINSN V
Normal T_{owr} 43db

Channel Number: 100
Rx 262.375 T 295.975


NarrowBand (5 kHz)

CURRENT MODE
SATCOM - M2 Sα- - 012
TEK 2 PSK ANDVT V2400
Normal T_{owr} 43dbm

Channel Number: 144
Rx 248.965 T 302.565
AN/PSC-5 DIFF

Peaking Satellite Signal


- Move the antenna from side to side while observing the field strength indicator. Adjust for maximum strength indication.
- Move the Antenna up and down and peaking the field strength indicator.
- The AN/PSC-5 is ready to support communications.

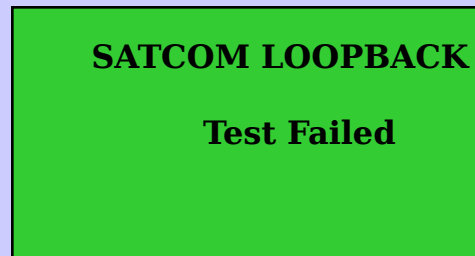
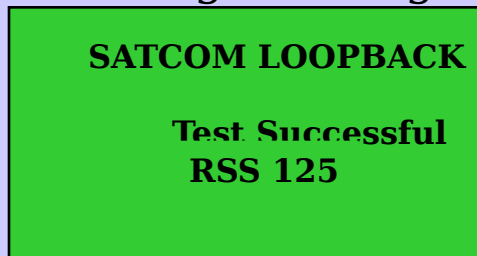
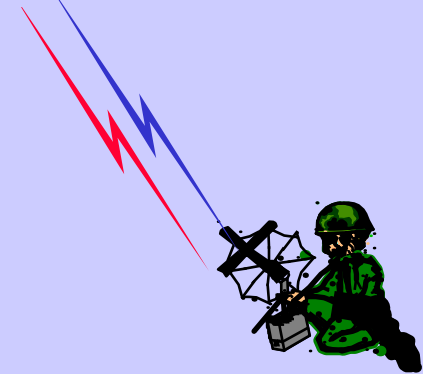
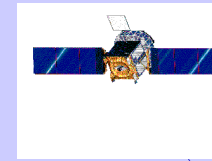


CURRENT MODE
SATCOM - Sq- -034
TEK 1 FSK VINSN V16
Normal T_{owr} 43dbm

Channel Number: 100
Rx 262.375 T 295.975

Satellite Loopback

- Note: The test must be performed with PSK modulation on an approved SATCOM channel.
- ESC to the Main Menu.
-  **Use Hot Keys #4 & #2.**
- The display will show the current satellite channel.
- Press the ENT key to initiate the test.
- The result may be within the range of 0 to 255, or the test may fail.
- A good range is 100 to 255.



Modifying Current Mode SATCOM

- Preset parameters can be altered in the Current Mode.
- When modifications are made, the Preset letter “P” will change to “M” for Modified.
- When Receiving, the signal strength indicator will change to “Rx-CT-055” or “Rx-PT-055”
- When Transmitting, the indicator will change to “Tx-CT-123” or “Tx-PT-123”

CURRENT MODE
SATCOM - P1 Sα- -010
TEK 1 PSK ANDVT
Normal Tpw
43dbm

CURRENT MODE
SATCOM - M1 Sα- -010
TEK 1 PSK ANDVT D2400
Normal Tpw
43dbm

Change Voice to

Indicator Data Range	Signal Level (dbm)	Comment
9 - 14	≤ - 127	Receiver Noise Floor
20 - 35	-124 to -121	1 E-3 BER Limit
35 - 70	-117 to -102	SATCOM Downlink
70 - 100	-102 to -85	Ground LOS
100 - 130	-85 to -75	Ground to Air (LOS)
130 - 175	-75 to -45	Close Signal

Data Devices

KL-43C/F Interface

- Connect the KL-43C/F to the AN/PSC-5 AUX connector with the W1 cable.
- The KL-43C/F must be configured in the Digital communications Mode using a data rate of 75, 300, 600, 1200, 2400, 4800, or 9600 bps.



AN/PSC-2A Interface

Connect the
AN/PSC-2A to
the AN/PSC-5
AUX
connector via
the W2 cable.



Demand Assigned Multiple Access (DAMA) Introduction

Lesson Topics

- DAMA Evolution
 - Non-DAMA SATCOM, TDMA, DAMA
 - Satellites
 - Footprints & Controllers
- DAMA Implementation
 - Demand Assigned Example
 - Capabilities
- DAMA Terms
- DAMA Concepts
 - Advantages/Disadvantages
 - 5 kHz/25 kHz Comparisons

DAMA Evolution

Communications Opportunities



Dedicated Channel

TIME →



Idle

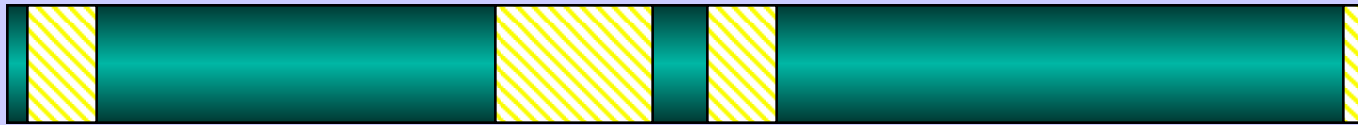
DAMA Evolution

- Dedicated Channels
 - Assigned to a user by a PERSON after coordination
 - Full time use of channel until told by System Manager
 - Time slots do not have true control
 - Wasted resources when channel is not in use

DAMA Evolution

Non-DAMA SATCOM

Communications Opportunities



Dedicated Channel - 15% traffic 85% idle

TIME —————→



Comm 1



Idle

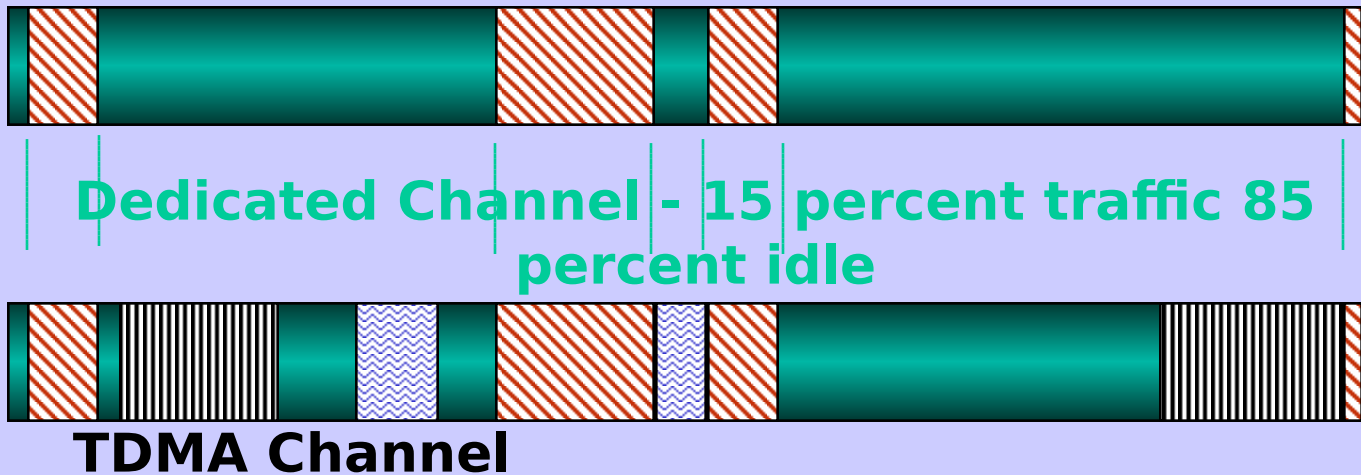
DAMA Evolution

- Time Division Multiple Access (TDMA)
 - Assigned to several users by a PERSON after coordination
 - Synchronized Frame Format provided by Machine
 - Full use of channel bandwidth for short intervals (slots) on a set periodic basis (frames)
 - Full use of slot until told by System Manager

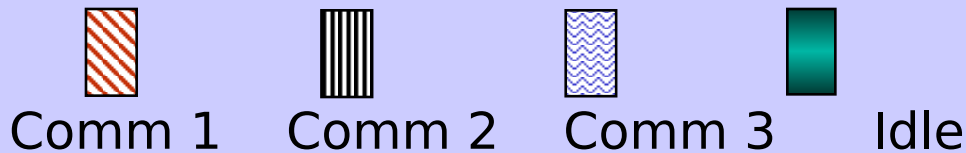
DAMA Evolution

TDMA

Communications Opportunities



TIME



DAMA Evolution

Demand Assigned Multiple Access (DAMA)

- Assigned to several users by a machine

- Synchronized Frame Format provided by Machine

- Must ask machine to communicate

- Full use of channel bandwidth for short intervals (slots) on a periodic basis (frames) until communication is complete

- Communications are pre-emptable

DAMA Evolution

Multiple Access

Communications Opportunities



Dedicated Channel - 15 percent traffic 85 percent idle



DAMA Channel - 95 percent traffic 5 percent idle

TIME →



Comm 1



Comm 2



Comm 3



Comm 4



Comm 5



Idle

DAMA Evolution

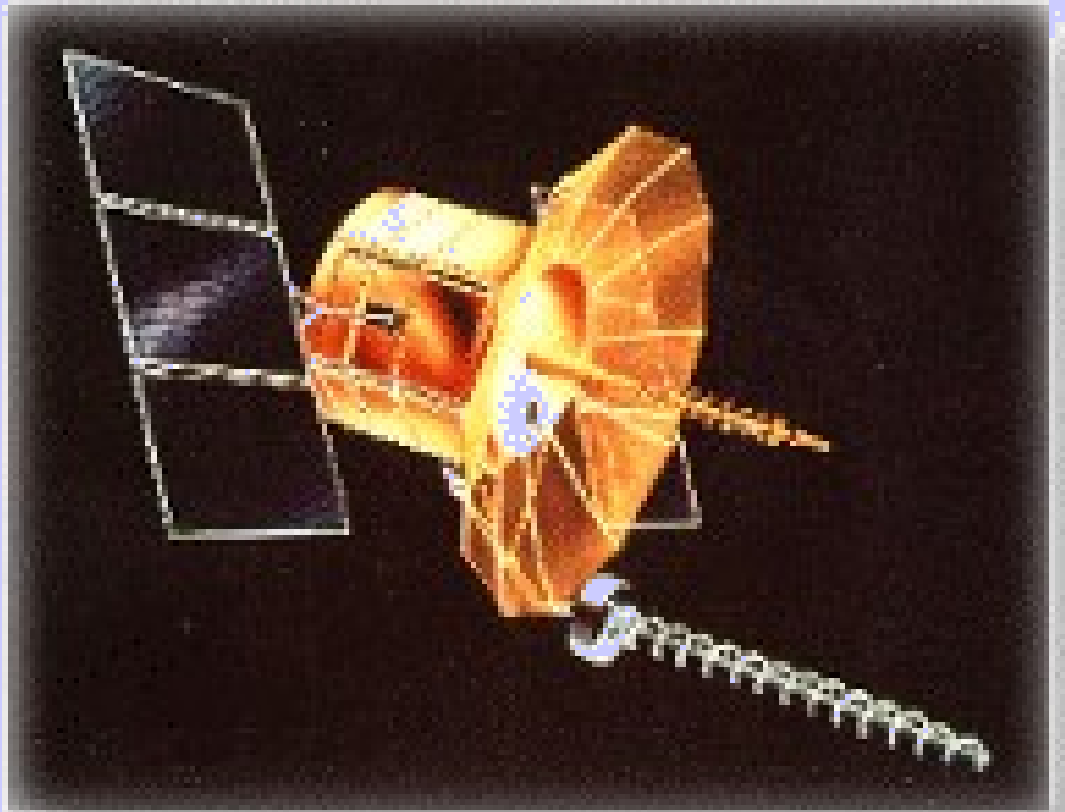
- Demand Assigned Single Access (DASA)
 - Assigned to several users by a machine
 - Must be operating on DAMA channel prior to request
 - Must ask machine to communicate
 - Assigned Full time use of different channel for specified time period
 - Returned to DAMA channel automatically after time period
 - Communications are not pre-emptable

DAMA Evolution

DAMA Concepts

- Increases Satellite Access with Existing Bandwidth
- Improves usage efficiency
 - Demand Assignment
- Supports higher user demand
 - Multiple Accesses
- Automates channel control

DAMA Evolution



Fleet Satellite (FLTSAT)

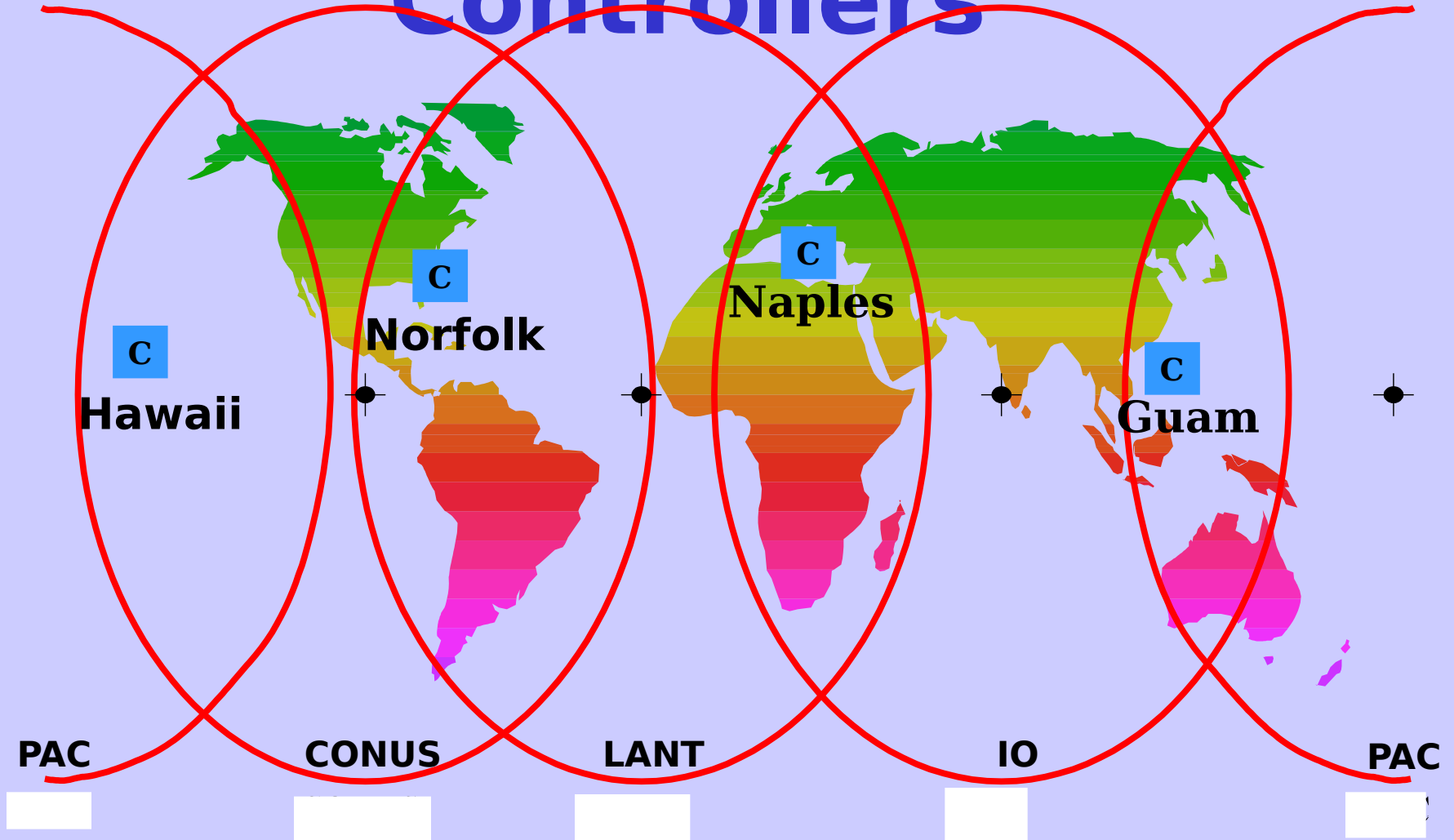
DAMA Evolution

**Ultrahigh Frequency
Follow-on (UFO)
Satellite**

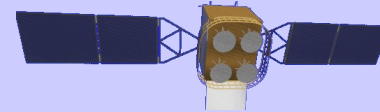


DAMA Evolution

Footprints & Controllers

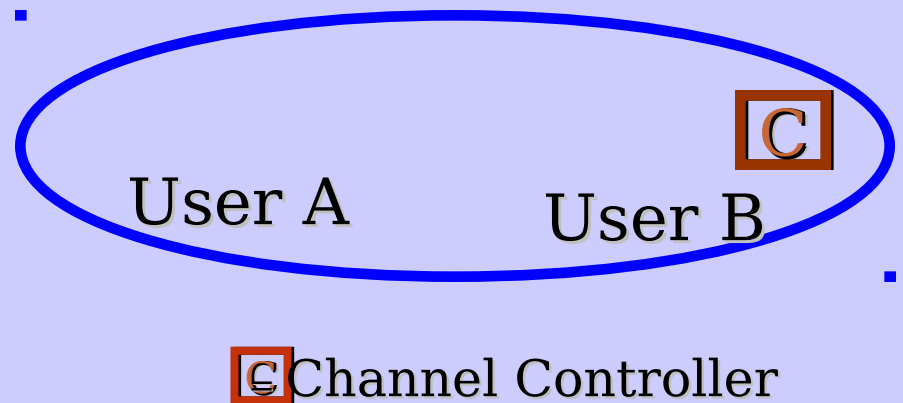


DAMA Implementation



Communication: A Four Step Process

USER	
CONTROLLER	
Access Request	
	Controller
Verifies	
Slot/Frequency Assigned Users Communicate	

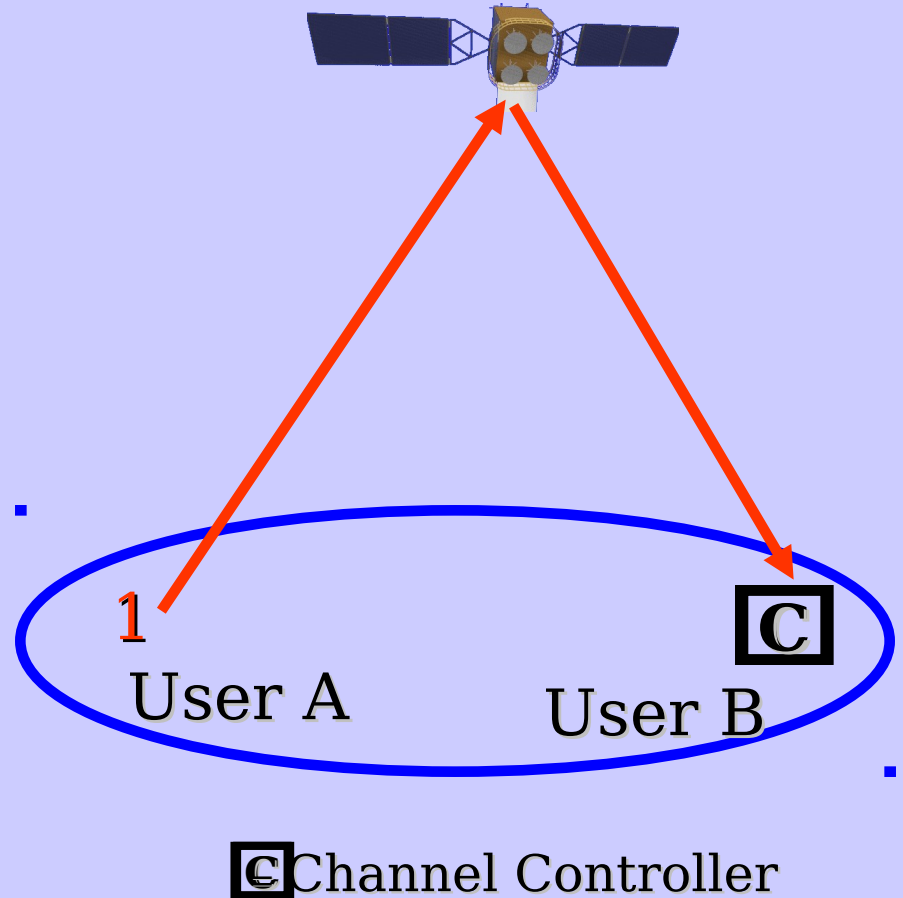


DAMA CONCEPTS - DEMAND ASSIGNED (Example)

DAMA Implementation

Communication: A Four Step Process

USER	
CONTROLLER	
Access Request	
	Controller
Verifies	
Slot/Frequency Assigned Users Communicate	

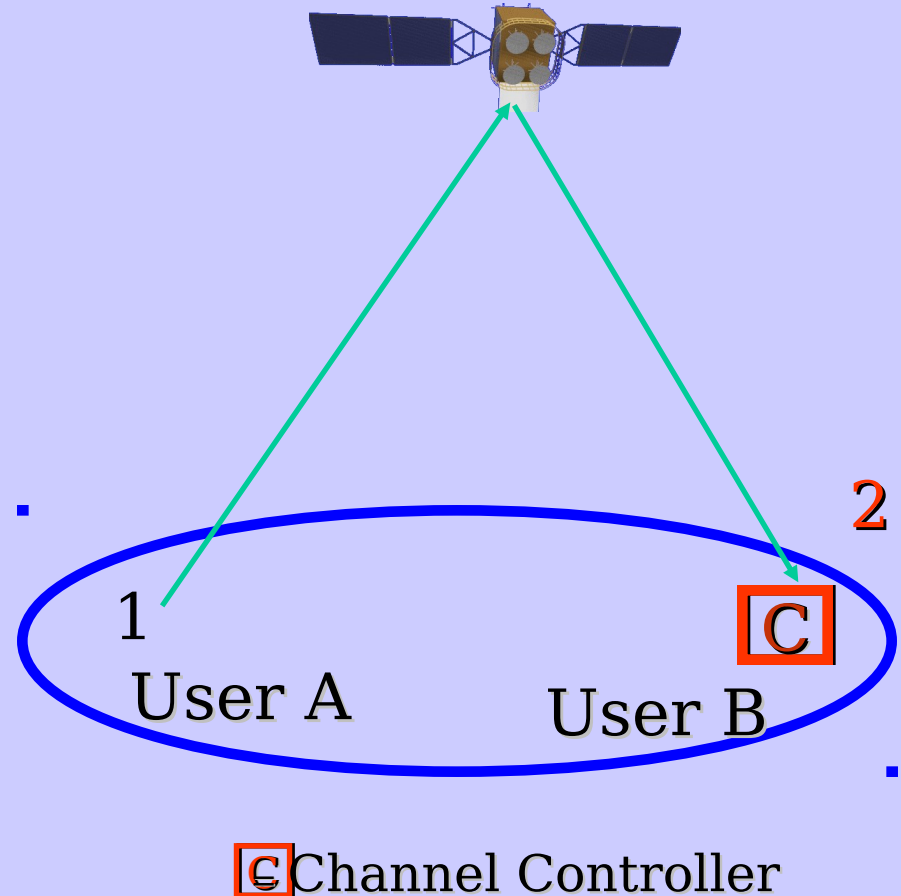


DAMA CONCEPTS - DEMAND ASSIGNED
(Example)

DAMA Implementation

Communication: A Four Step Process

USER	
CONTROLLER	
Access Request	
	Controller
Verifies	
Slot/Frequency Assigned	
Users Communicate	

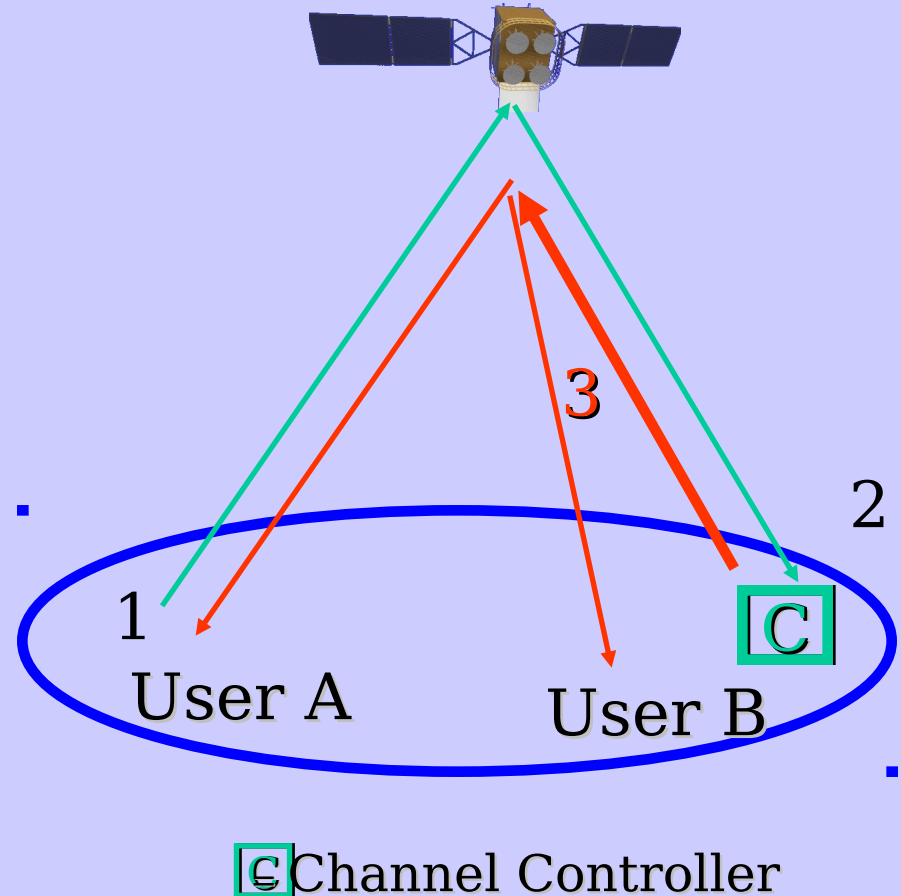


DAMA CONCEPTS - DEMAND ASSIGNED (Example)

DAMA Implementation

Communication: A Four Step Process

USER	
CONTROLLER	
Access Request	
	Controller
Verifies	
Slot/Frequency Assigned	
Users Communicate	

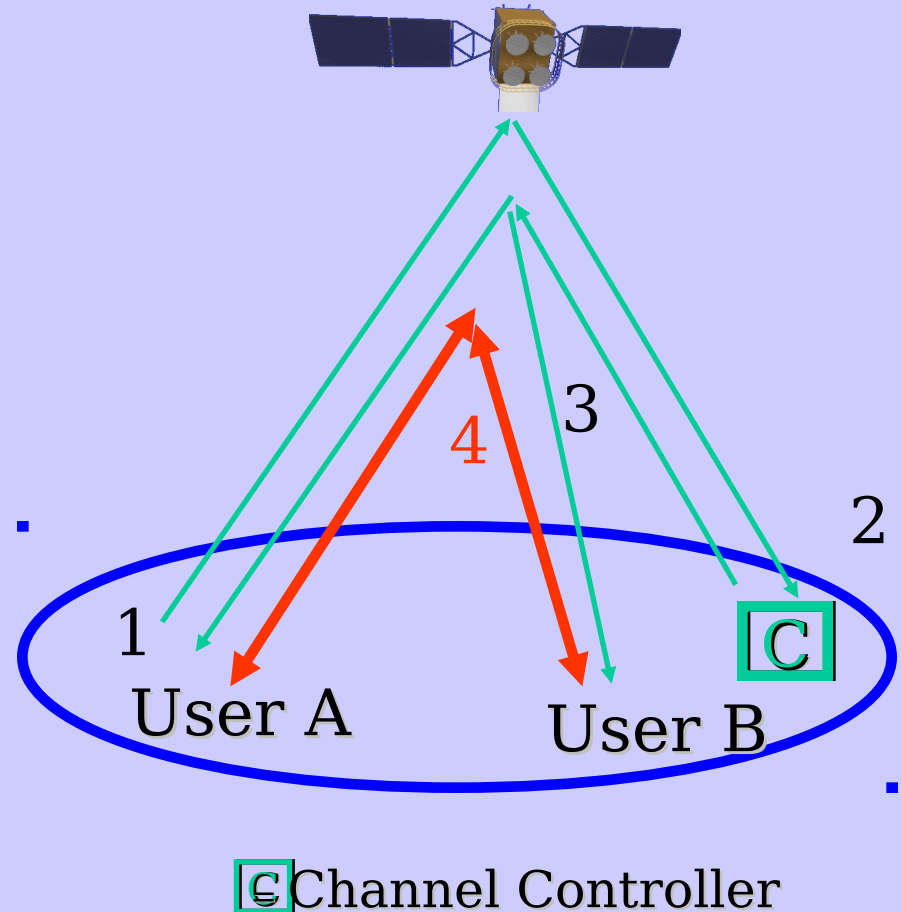


DAMA CONCEPTS - DEMAND ASSIGNED (Example)

DAMA Implementation

Communication: A Four Step Process

USER	
CONTROLLER	
Access Request	
	Controller
Verifies	
Slot/Frequency Assigned	
Users Communicate	



DAMA CONCEPTS - DEMAND ASSIGNED (Example)

DAMA Implementation

5 kHz Capabilities

- Packetized Message Services
- Waveform designed for short data messages
 - Processes up to 900 messages per hour (average message 3000 bits)
- Circuit Service
 - Voice & Data
 - Unlimited Duration
- Waveform consideration - long frame length leads to long set-up times and turnaround delays for voice

DAMA Implementation

25 kHz Capabilities

- Waveform designed for Voice & Data users
 - Single Channel supports five NBSV (ANDVT) and 13 Data Circuits Simultaneously (259 Frame Format)
 - Short TDMA frame length (compared to 5-kHz DAMA) provides quicker voice turn around
 - Basic 25-kHz TDMA waveform (DC Mode) used successfully by Navy since the 1980s
- Provides Two-Party Calls
 - Point-Point
 - Point to Group (Netted)
- Provides Conference Calls

DAMA Implementation

25 kHz Capabilities

- Allows for NBSV and Vinson
- 75 - 16k bps
- Information Requests/Reports
 - Coded Messages between Terminals & Controllers
- Zeroize Terminal
- Frame Format Changes
- Frequency Switching
- Channel Control Handover

DAMA Implementation

DAMA Access

- Written authorization
 - Satellite Access Request (SAR)
 - Satellite Access Authorization (SAA)
- Preset data
- Encryption keys
 - COMSEC
 - Orderwire
- Terminal data (address)

DAMA Terms

Network Timing

- A terminal must acquire the network timing prior to any transmission
- Network timing is acquired and maintained by receiving two Master Frames from the controller prior to ranging
- A terminal may use passive or active ranging to stay in synch

DAMA Terms

Ranging

- Contention - Causes Transmit Collision
 - Should only be possible during non-scheduled frames or segments
 - Built in measures to reduce collisions
- Ranging - terminal determines distance to satellite
 - Active Ranging
 - » Manual Contention ranging (5 kHz Silent Mode)

DAMA Terms

Addresses

- All DAMA USERS have a unique DAMA address
 - Address is user address NOT terminal address
 - If equipment is changed, address is transferred to new equipment
- Networks
 - Composed of 2 or more users
 - Assigned DAMA addresses
- Guard Lists - used to monitor communications
 - Guard Lists may contain up to 15 addresses
 - Guard Lists may contain user or network addresses
 - Demarcation point
- DAMA System supports 65,535 addresses

DAMA Terms

5 kHz Orderwires

- Forward Orderwire (FOW) - controller to terminal communications
 - Describes the following frame
 - Variable in size (all 5 kHz frames)
 - Communication slot assignments
- Return Orderwire (ROW) - terminal to controller communications
 - Ranging
 - Responses to controller requests
 - Terminal contention transmissions

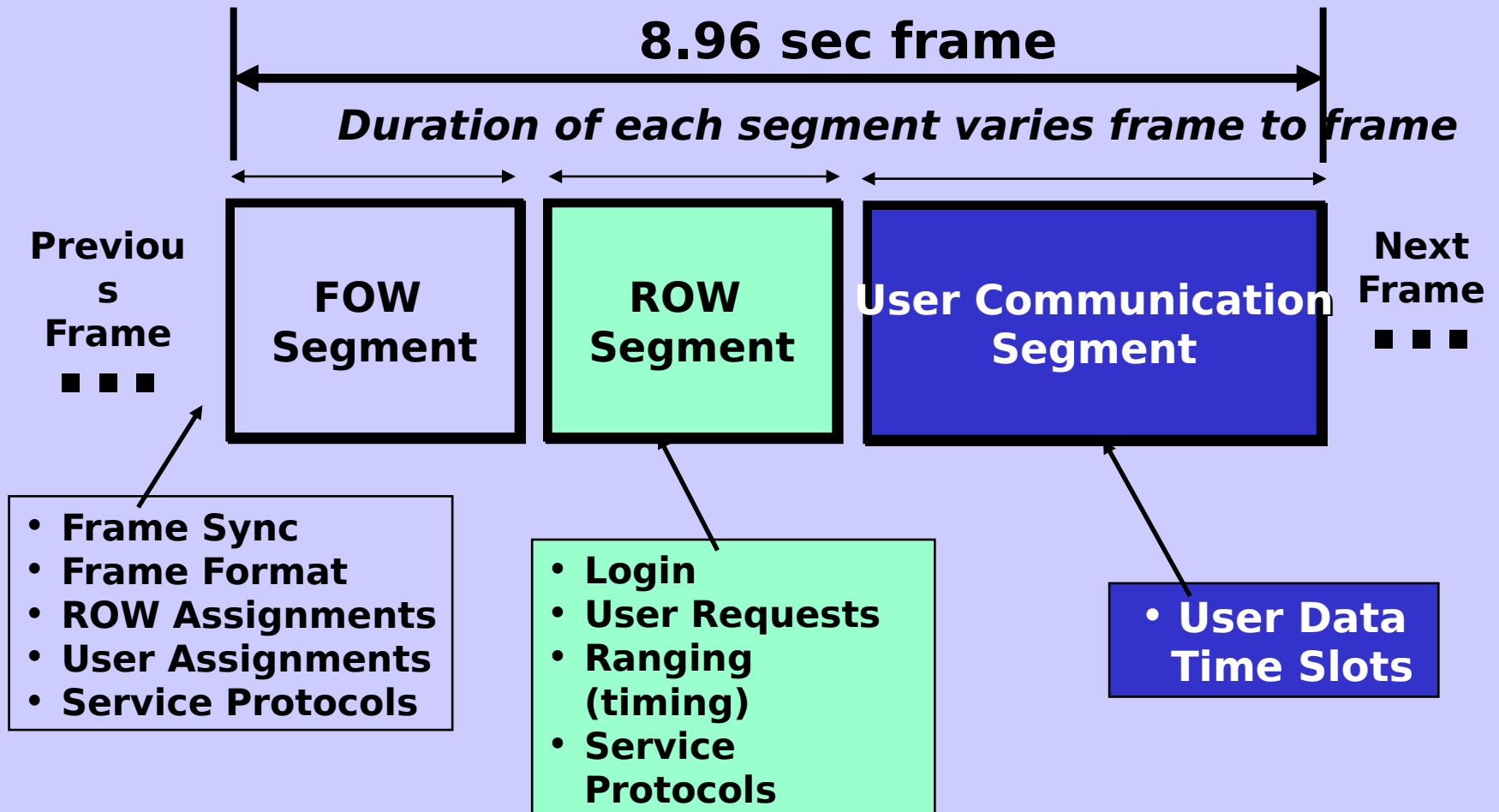
DAMA Terms

25 kHz Orderwires

- Channel Control Orderwire (CCOW)
 - Controller to terminal communications
 - fixed frame size
 - Identifies beginning of frame and frame format
- Return Channel Control Orderwire (RCCOW)
 - Fixed frame size
 - One terminal to controller transmission per frame
 - Ranging segment is not part of RCCOW frame

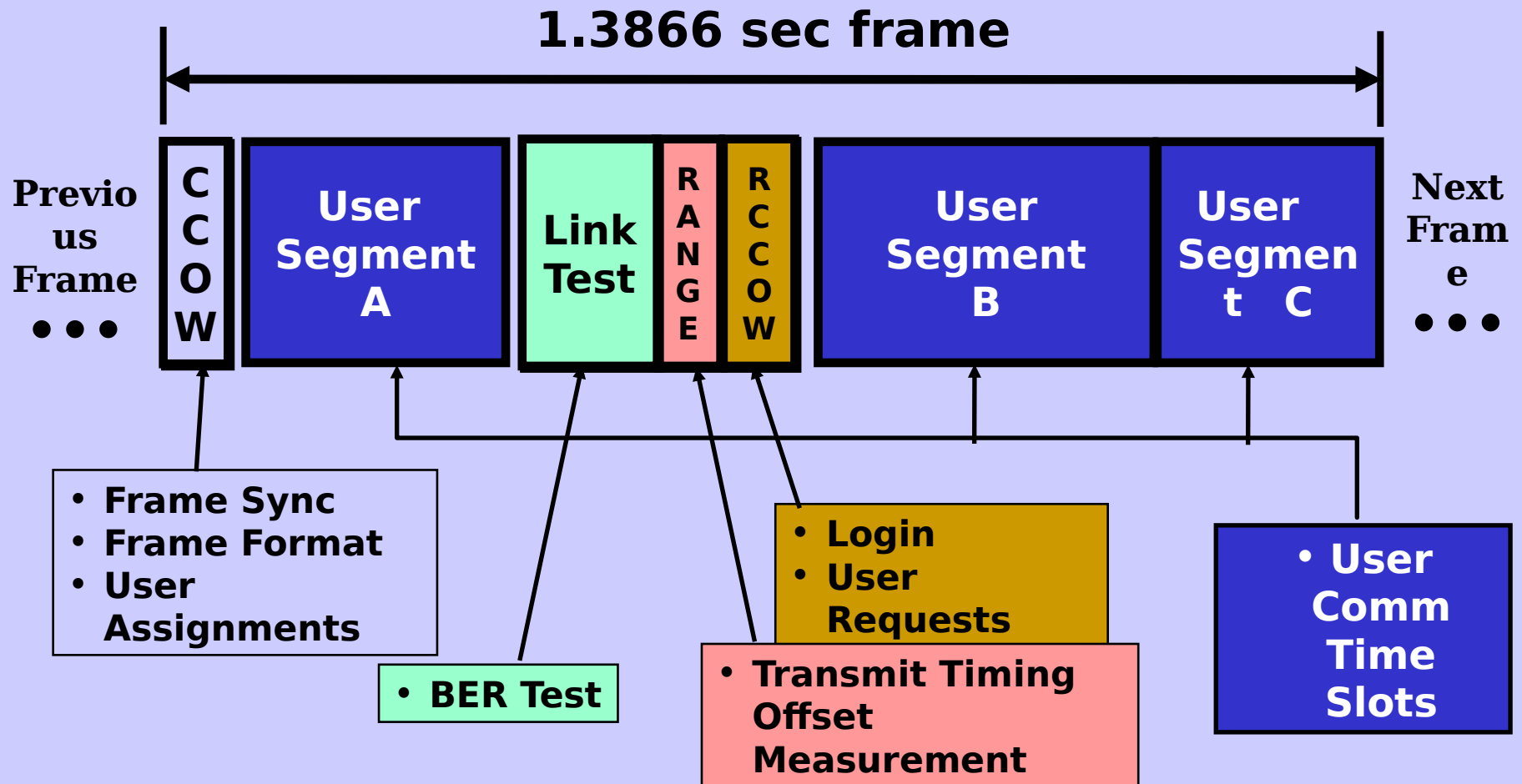
DAMA Terms

5 kHz DAMA Frame



DAMA Terms

25 kHz DAMA Frame



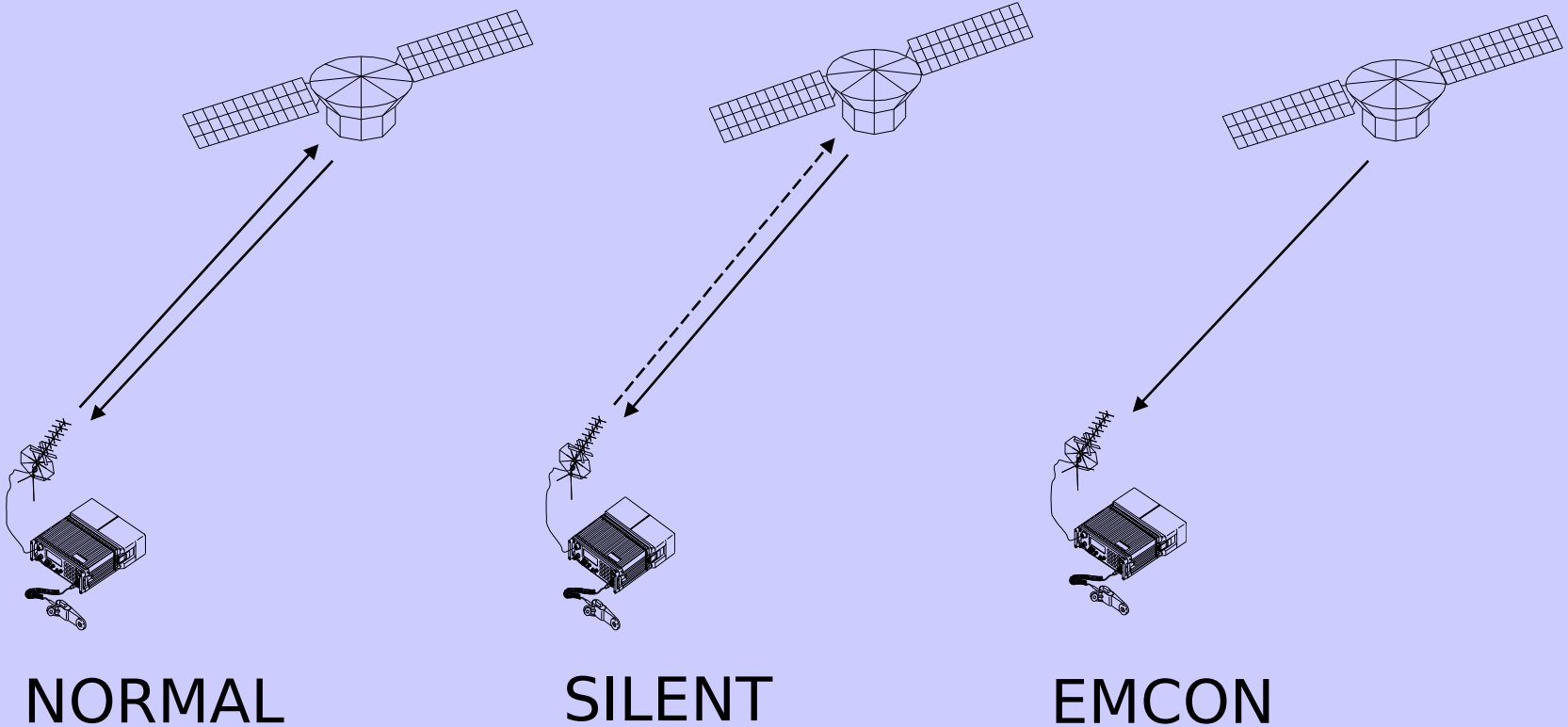
DAMA Terms

Encryption

- DAMA System requires at least 2 KEYS
- DAMA ORDERWIRE KEY
 - Must have KEY to gain access to system
 - Use of key directed by DAMA Controller
- User Communication KEY
 - Use of KEY is under Operational control
 - DAMA system allows use of non-encrypted Data communications

DAMA Terms

Orderwire Communication Modes



DAMA Terms

- Configuration Codes - identifies to the controller the baseband equipment which is attached to the terminal I/O port
 - 5 kHz is 3 digits in length
 - 25 kHz is 2 digits in length
- Information Request Codes - communicates a predefined message from the controller, usually indicating the reason for a canceled call request
- Information Report Codes - information request code response from the terminal/user

DAMA Terms

DASA

- **Demand Assigned Single Access (DASA)**
 - Must operate on DAMA channel prior to request
 - Assigned full time use of different channel for specified period
 - Terminal(s) revert to DAMA Channel automatically at end of specified period
 - Dedicated Channels not under DAMA Control

DAMA Concepts

- 5 kHz DAMA requires reception of each FOW otherwise the terminal may not participate in the next frame (sending or receiving communications traffic or sending ROW)
- 25 kHz DAMA does not require reception of each CCOW for continued communications, but commands are only sent once
- DAMA only provides the “physical” connection (time on the satellite). Data interoperability and protocols are the responsibility of the data devices and their software

DAMA Concepts

- Efficient DAMA operations require operators to:
 - Request service when needed
 - Use the assigned service
 - Teardown (give up) service when finished
- DAMA requires a wait for circuit services based on the priority of the communication
- Think of 5 kHz Message services as the “Email of SATCOM”
- Use of DAMA requires **planning** and **coordination**:
 - Between the comm planner and the terminal operators
 - Between the comm planner and the DAMA Control Stations

DAMA Concepts

- Increases Satellite Access with Existing Bandwidth
- Supports higher user demand
 - Multiple Accesses
- Improves usage efficiency
 - Demand Assignment
 - NBSV with ANDVT
- Automates channel control
- **Patience is required**

DAMA Concepts

5 kHz - 25 kHz Comparison

5-kHz DAMA

- Optimized for DATA
- Delays are noticeable in voice transmissions
- DASA channels may relieve some delays
- Multiple Hop capability
- Mickey-Mouse-voice is not the fault of DAMA - it is the KY-99 vocoder
- Requires less power to close link than 25 kHz

25-kHz DAMA

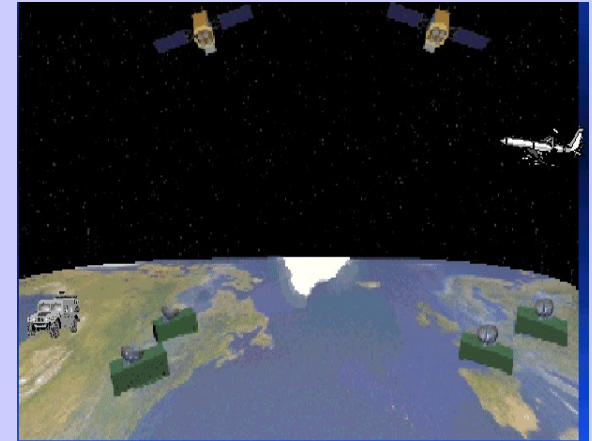
- More than one user concurrently on channel
- Slower the data rates, the more users can be accommodated
- KY-99 vocoder used for 2.4 kbps voice here, too
- Paging capability available
- DASA channels should be used for large transmissions

Pre-mission DAMA Set-up

5 kHz DAMA Cut Sheet

Example

DAMA PRESETS								
Parameter	Value		Presets					
			1	2	3	4	5	6
Encryption	VINSON							
	KG-84				x			
Comm	ANDVT		x	x				
	Voic		x					
Data Rates	Data			x	x			
	Vinson	16K						
	ANDVT	75						
		300						
		600						
		1200		x				
		2400	x					
	KG-84	75						
		300						
		600						
		1200						
		2400			x			
		9600						
		16K*						
Channel Variant	5KHz		x	x	x			
	25KHz							
Tpwr (dBm)	23 to 43		43	43	43			
Channel #	1-239 or 999		140	140	140			
Config Code	00 to 99		1	1	1			
OW Encryption	PT							
	CT		x	x	x			
Mode of Operation	Normal		x	x	x			
	EMCON							
	Silent							
Ranging	Active		x	x	x			
	Passive							
	Maint							
Satellite ID*	1 to 8							



COMSEC Keys				
Key #	Type		Update	
	ANDVT	VINSON	KG-84	
1	X			
2	X			
3			X	
4			X	
5		X		
OTAR				*

5 kHz DAMA Cut Sheet

Example (continued)

Orderwire Keys

Orderwire Key Position	Orderwire Key Name
1	USXXX1122
2	USXXX1123

SATELLITE EPHEMERIS

Satellite ID		1	2	3	4	5	6	7	8
LON	E	Deg							
		Min							
		Sec							
	W	Deg							
		Min							
		Sec							
Ascension Time	Hrs								
	Min								
Inclination Angle	Deg								

5K DAMA I/O Rates

Data Rate	Select
75	
300	
600	
1200	X
2400	X
9600	
16K	C2-2

Guard List

Guard Address #	Guarded Address
1	12001
2	12002
3	12003
4	16333
5	15299

TERMINAL DATA

Terminal Address		12000	
LAT	N	Min	
		Sec	
	S	Min	
		Sec	
LON	E	Min	
		Sec	
	W	Min	
		Sec	
Terminal Time	Hrs		
	Min		
Platform	Stationary		
	Mobile		
Msg Release	Auto		
	Manual		

Programming Presets

 Hot Key #3

MAIN MENU

1. - CURRENT MODE
2. - DATABASE OPTIONS
3. - SET PRESETS
4. - BIT OPTIONS
5. - MAINTENANCE

Programming Presets

(continued)

SET PRESET
DAMA - P#
PSK ANDVT V2400
5 kHz Tpw 43 dbm

Channel Number ###
R ###.### T ###.###
Code: ### OW: CT
Normal Range: Active

If Passive
Ranging is
used, the
Satellite ID is
required.

Normal Range: Passive
Satellite ID: #

Database Options

ESC to the Main
Menu.



Use Hot Key #2
to access the
Database Options
Menu.

Menu Options
required
for the DAMA
Modes



MAIN MENU

1. - CURRENT MODE
2. - DATABASE OPTIONS
3. - SET PRESETS
4. - BIT OPTIONS
5. - MAINTENANCE

DATABASE MENU

1. - STATUS MSG
2. - GUARD LIST
3. - TERMINAL DATA
4. - 5kHz I/O RATES
5. - SAT EPHEMERIS
6. - INFO CODES
7. - COMSEC KEY STATES
8. - CLONE MODE

Guard List



Hot Key #2 (**GUARD LIST**)

DATABASE MENU

1 - STATUS MSG

2 - GUARD LIST

3 - TERMINAL DATA

VIEW
MODIFY
ADD
DELETE

GUARD LIST

VIEW

1 #####

4 #####

7 #####

10 #####

13 #####

Terminal Data

From the Main Menu,
 press

Hot Keys

- #2 - Database Options
- #3 - Terminal Data



MAIN MENU
1 - CURRENT MODE
2 - DATABASE OPTIONS
3 - SET PRESETS



DATABASE MENU
1 - STATUS MSG
2 - GUARD LIST
3 - TERMINAL DATA

Terminal Data

(continued)

TERMINAL DATA

LAT: N ##:##

LON: E ##:##

TIME: ##:##Z

ADDRESS: #####

PLATFORM: STATIONARY

MSG RELEASE: MANUAL

Satellite Ephemeris Data

- From the Main Menu



Use Hot

Keys

- **#2** - DATABASE OPTIONS
- **#5** - SAT EPHEMERIS.
- ID range is 1 to 8
- Satellite Longitude
- Satellite Time of Ascension
- Inclination Angle at time of Ascension

SATELLITE EPHEMERIS

ID: 8

LON: E ###:###:##

ASCEN TIME: ##:##?

INCLINATION: ##.##

Information Codes

- **From the Main Menu**



Use Hot Keys

- **#2** - DATABASE OPTIONS
- **#6** - INFO CODES.

- **Used for 25 kHz DAMA Only**

- There are 100 possible Information Request Codes (00 -99) that can be sent by DAMA Control.
- There are 255 possible Information Response Codes (001 - 255) for 25 kHz DC DAMA.
- There are 16,383 possible Information Response Codes (00001 - 16383) for 25 kHz AC DAMA.

INFORMATION CODES

AC 01 12345

5kHz I/O Data

Rates

(Asynchronous)

(Devices without external
clocks)

- From the Main Menu, (AN/PSC-2, KL-43C/F, DMDG)



Use Hot Keys

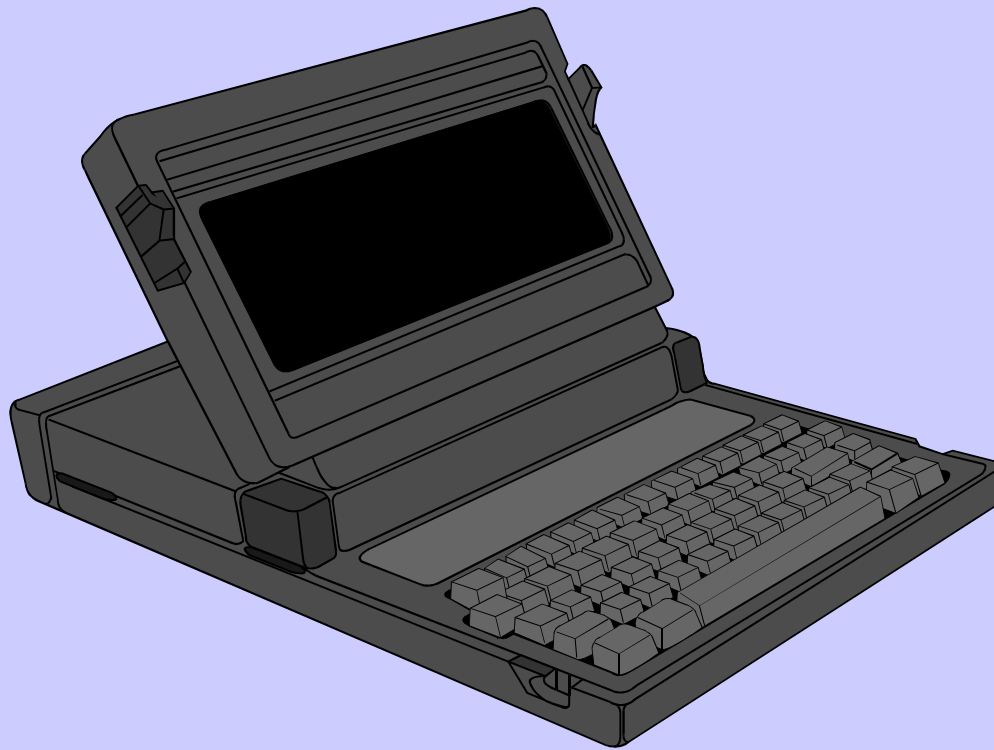
- #2 - DATABASE OPTIONS
- #4 - 5kHz I/O Data Rates

- These are not Over the Air data rates. They are the interface rates between an external data device connected to the AUX connector of the AN/PSC-5.

DAMA 5 kHz I/O Rates			
___ 75	___ 300	___ 600	
✓ ___ 1200	✓ ___ 2400	___ 9600	
___ 16K			

5kHz I/O Data Rates

(Devices with external clocks)
(Synchronous)



5 kHz DAMA Operation

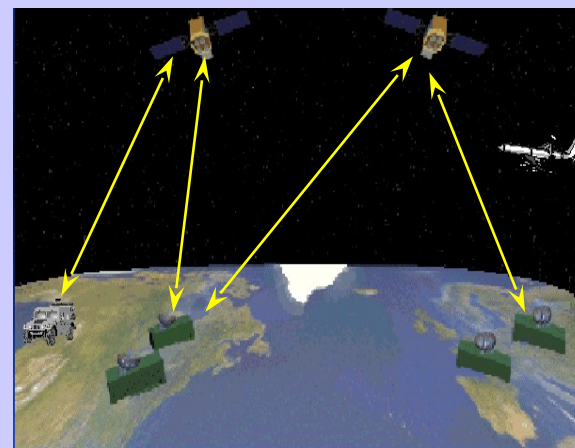
MISSION DATA PRESET

Mission Cut Sheet

Example

DAMA PRESETS

Parameter	Value	Presets					
		1	2	3	4	5	6
Encryption	VINSON						
	KG-84			X			
Comm	ANDVT	X	X				
	Voice	X					
	Data		X	X			
Data Rates	Vinson	16K					
	ANDVT	75					
		300					
		600					
		1200		X			
		2400	X				
	KG-84	75					
		300					
		600					
		1200					
		2400			X		
		9600					
		16K*					
Channel Variant	5KHz	X	X	X			
	25KHz						
Tpwr (dbm)	23 to 43	43	43	43			
Channel #	1-239 or 999	140	140	140			
Config Code	00 to 99	1	1	1			
OW Encryption	PT						
	CT	X	X	X			
Mode of Operation	Normal	X	X	X			
	EMCON						
	Silent						
Ranging	Active	X	X	X			
	Passive						
	Maint						
Satellite ID*	C3-1 1 to 8						



COMSEC Keys

Key #	Type			Update
	ANDVT	VINSON	KG-84	
1		X		0
2	X			2
3			X	1
4			X	4
5	X			5
OTAR				*

5 kHz DAMA Pre-Mission

Cut Sheet Example

Orderwire Keys

Orderwire Key Position	Orderwire Key Name
1	USXXX1122
2	USXXX1123

Guard List

Guard Address #	Guarded Address
1	12001
2	12002
3	12003
4	16333
5	15299

SATELLITE EPHEMERIS

Satellite ID			1	2	3	4	5	6	7	8
LON	E	Deg								
		Min								
		Sec								
	W	Deg								
		Min								
		Sec								
Ascension Time		Hrs								
		Min								
Inclination Angle		Deg								

TERMINAL DATA

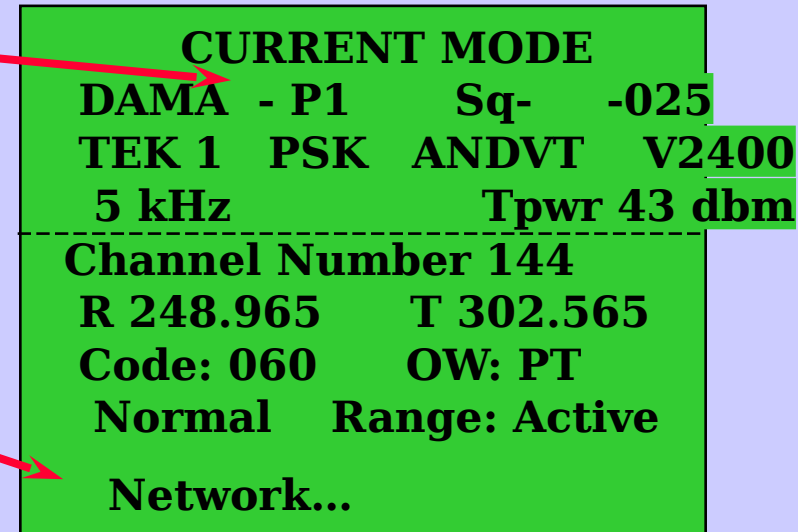
Terminal Address		12000	
LAT	N	Min	
		Sec	
	S	Min	
		Sec	
LON	E	Min	
		Sec	
	W	Min	
		Sec	
Terminal Time	Hrs		
	Min		
Platform	Stationary		
	Mobile		
Msg Release	Auto		
	Manual		

5K DAMA I/O Rates

Data Rate	Select
75	
300	
600	
1200	X
2400	X
9600	
16K	

5 kHz DAMA Operation

- To begin, select a 5 kHz DAMA Preset.
- Press the NEXT or PREV key until the cursor highlights the word “Network...”
- Press the ENT key.
- The RT will initialize and displaying “CONFIGURING: WAIT.”



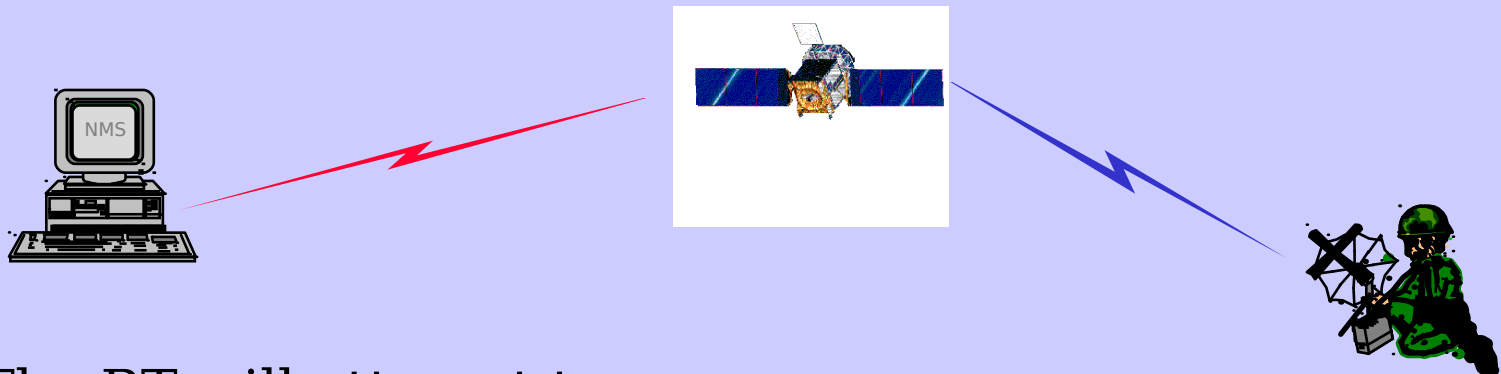
CURRENT MODE
DAMA - P1 **Sq- -025**
TEK 1 PSK ANDVT V2400
5 kHz **Tpwr 43 dbm**

Channel Number 144
R 248.965 **T 302.565**
Code: 060 **OW: PT**
Normal **Range: Active**
Network...

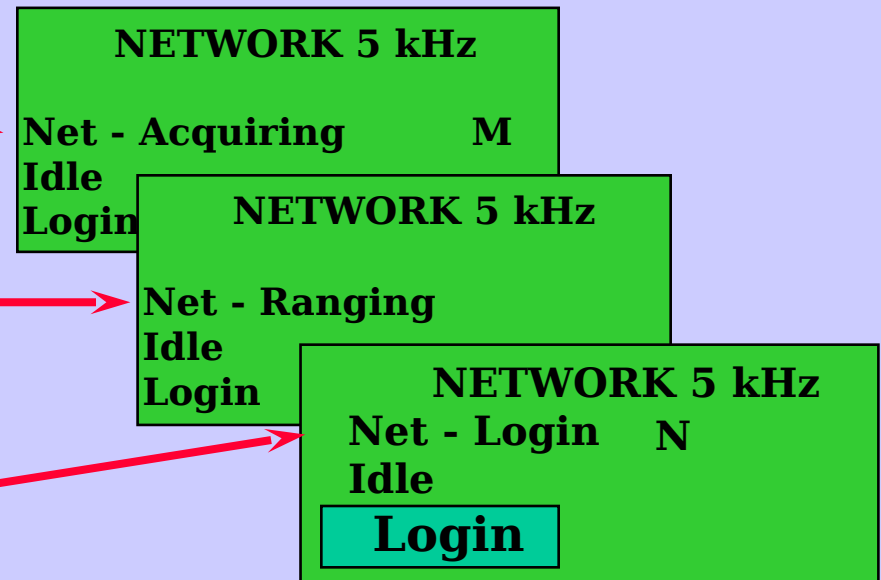
Two red arrows originate from the text in the list. The first arrow points from the word "Network..." in the second bullet point to the "Network..." line at the bottom of the menu. The second arrow points from the word "5 kHz" in the first bullet point to the "5 kHz" line in the "CURRENT MODE" section of the menu.

5 kHz DAMA Operation

Acquisition & Ranging



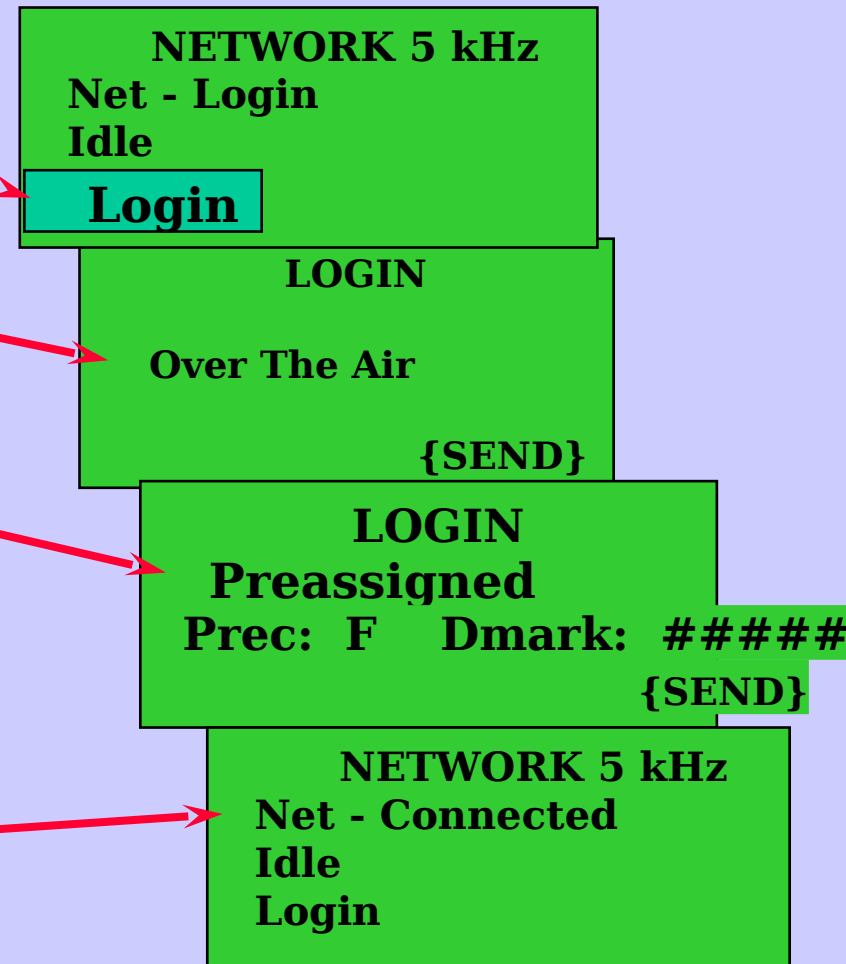
- The RT will attempt to receive an Orderwire signal.
- The RT synchronizes with DAMA Controller and the Satellite.
- The Radio is ready to Login.



5 kHz DAMA Operation

Login Procedure

- With the cursor on “Login”, press the ENT key.
- Methods for RT Login:
 - Over-The-Air
 - Initial Login
 - Preassigned
 - Requires pre-coordination between your Communications Planner and the DAMA Controller.
- Login Accepted by DAMA Control.



5 kHz DAMA Menu


5 kHz DAMA Menu

Login

- 1. Service Setup**
- 2. Teardown**
- 3. Service State**
- 4. Network State**
- 5. Status Messages**
- 6. Logout**
- 7. Contention Ranging**
- 8. Message Queue**

5 kHz DAMA Operation

Circuit Service Setup

- From the 5 kHz DAMA menu,  **Use HOT key #1** to setup a service.
- At the first cursor position, select **CIR** for Circuit Service or **DED** for DASA Service.
- Finish entering the required data in each field:
 - EN/UN = Encrypted/ Unencrypted
 - ASYN/SYN = Asynchronous/Synchronous
 - V/D = Voice/Data
 - communications Data Rate (IAW 5k I/O Rates)
 - Circuit Precedence = R,P,I,E,FO
 - Destination Terminal Address or Network Address
 - Configuration Code
- When finished, **SEND** the request.

NETWORK 5 kHz

Net - Connected
Idle
1 Service Setup

Service Setup

CIR EN SYN V2400
Prec: R D: #####
Code: 001 {SEND}

Service Setup

CIR EN SYN V2400
Prec: R D: #####
Code: 001 {SEND}

5 kHz DAMA Operation

Circuit Service Assignment

- Once the request is sent, the terminal redisplay the Network screen.
- At anytime after the request is sent, the service request can be:
 - terminated
 - aborted
 - preempted
 - authorized.
- If the displayed service is correct, place cursor over the word Accept and press the ENT key.

NETWORK 5 kHz

**Net - Connected
Idle
Login**

SrvcAsgnd

CIR TEK1 ANDVT V2400

Prec: R EN

D#####S.#### {Accept}

5 kHz DAMA Operation

Circuit Service Connected

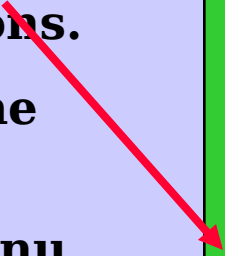
- The Service is now active and is ready for your communications.
- Press the ESC key to go to the Current Mode Menu.
- To return to the Network Menu, you must go through "Network..."
- In the Voice CT Mode, press the PTT switch, wait until a single beep is heard, then begin to talk.
- When responding to someone else, wait until the squelch breaks, wait an additional 10 sec, then begin to talk.
- Normal radio protocol applies.

NETWORK 5k

Net - Connected N

Conn - Rx/Tx

Login



CURRENT MODE

Tx-CT-125

DAMA - PT Rx-CT-034

TEK 1 PSK ANDVT V2

5 kHz Tpwr 43

5 kHz DAMA Operation

Modifying Current Mode

- Those fields indicated can be changed without causing the RT to be disconnected from an ongoing 5 kHz DAMA Operation.
- If the RT is accidentally disconnected, you must:
 - **Re-acquire**
 - **Range**
 - **Login (Preassigned)**
 - **Reconnect for Service.**

CURRENT MODE

DAMA - P1	Sq-	-025
TEK 1	PSK ANDVT	V24
5 kHz	Tpwr	43 dbm

Channel Number 140

R 248.935	T 302.535
Code: 001	OW: CT
Normal	Range: Active
Network...	

Dedicated Service Setup (DASA)

- Change the field from **CIR** to **DED** to establish a DASA Service.
- Finish entering the required data in each field:
 - EN/UN = Encrypted/ Unencrypted
 - ASYN/SYN = Asynchronous/Synchronous
 - V/D = Voice/Data
 - communications Data Rate
 - Precedence
 - Destination Terminal Address
(No Network Address allowed)
 - Configuration Code
 - Enter the duration of the Service.
- Submit the request.
- When the duration time elapses both terminals will automatically return to their previous 5 kHz DAMA configuration.

SERVICE SETUP

DED EN SYN V16k

Prec: R D: #####

Code: ### ## hr ##

{SE

Recommended Data Rates (bps)	5 kHz DAMA Mode
75,300,1200,2400	5k DAMA
2400	5k DASA
9600, 16K	25k DASA

Dedicated Service Setup

Service Assignment/Acceptance

- Once the request is sent, the terminal redisplay the 5 kHz Network screen.

```
NETWORK 5 kHz

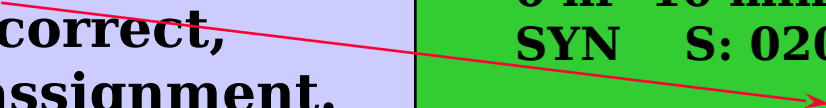
Net - Connected
Idle
Login
```

- If the request was valid, the controller sends a Service Assignment.
- If the data is correct, ACCEPT the assignment.

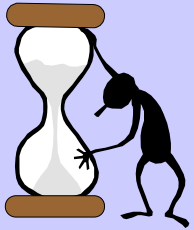
```
SrvcAsgnd

DED  TEK1  VINSON V16k
0 hr 10 min  EN
SYN  S: 02000

{ACCEPT}
```



Dedicated Service Setup



Timed Connection

- **What actually occurred? The DAMA controller sent a channel change to the terminal. The original 5 kHz DAMA channel parameters (including frequency) was replaced by the new 5 kHz DASA channel parameters.**
- **When the time period expires or the operator tears down the service, the 5 kHz DASA channel will revert back to the original 5 kHz DAMA channel.**


NETWORK 5k Dedicated

Net - Connected N
Conn ## hrs/m

2 - Teardown

5 kHz DAMA

Teardown

 **Use Hot Key #2** on the 5 kHz DAMA Menu.

- The Verify Teardown screen appears.
- SEND request.
- If no services are currently active, this screen results.
- ESC to the 5 kHz Network screen.



TEARDOWN
Verify Teardown

{SEND}



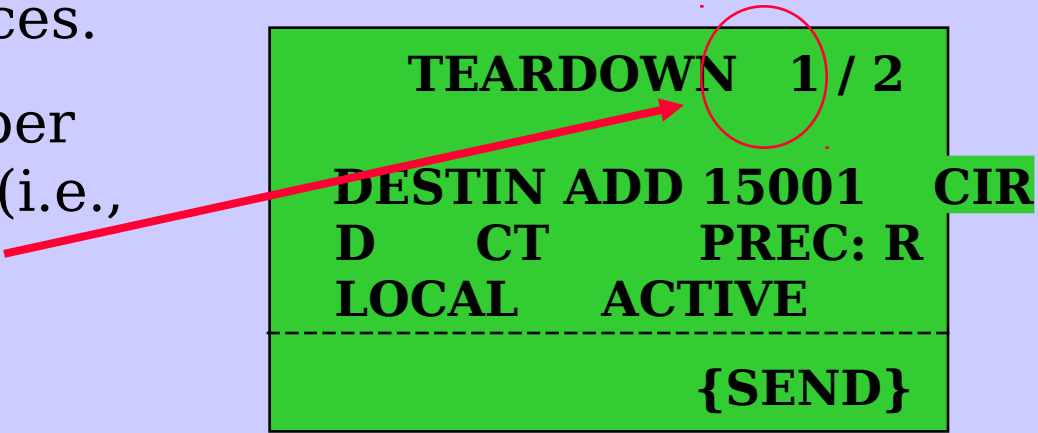
TEARDOWN
NO SERVICES ARE
CURRENTLY ACTIVE

5 kHz DASA

Teardown

 **Hot Key #1** on the
5 kHz DASA Menu.

- If there are multiple active services, the RT will display the current active services.
- Select the Service number that is to be Torn down (i.e., 1).
- SEND request.



TEARDOWN 1 / 2

DESTIN ADD 15001 CIR

D CT PREC: R

LOCAL ACTIVE

{SEND}

5 kHz DAMA

Teardown

- When the DAMA controller accepts the Teardown request, a Circuit Ended Status message is sent to the RT.
- The Circuit Ended Status Message will pop up on your display.
- Use the ESC key to return to the 5 kHz Network Menu. If no services are active, you will be in the Net-Connected, Idle state.



**Status Msg ____ of
Circuit Ended**



**NETWORK 5 kHz
Net - Connected
Idle
Login**

5 kHz DAMA

Service State

 **Hot Key**

#3
SERVICE STATE

DESTIN ADD ##### CIR
D CT PREC: R
LOCAL ACTIVE

OR

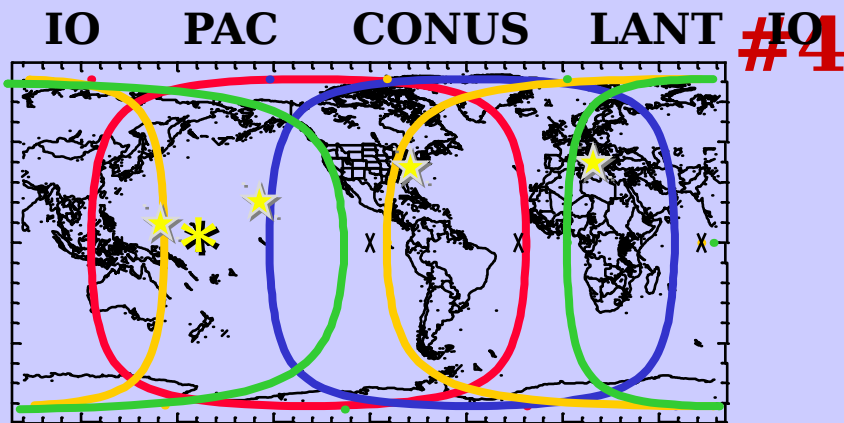
SERVICE STATE

**NO SERVICES ARE
CURRENTLY ACTIVE**

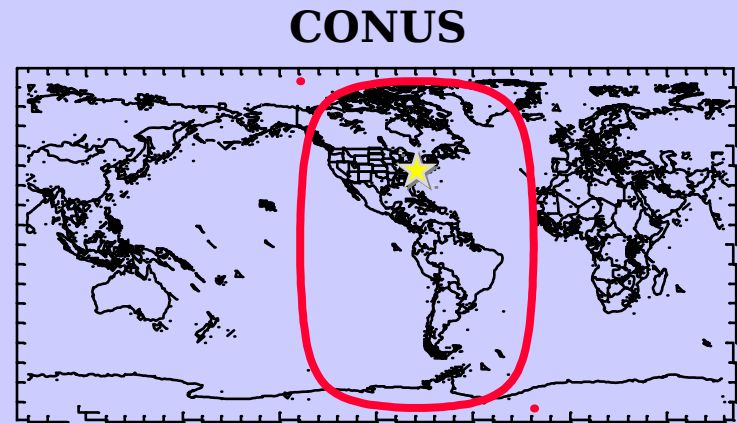
5 kHz DAMA

Network State

 **Hot Key**



or



MHOP

LOCAL

NETWORK STATE

PCC: ##### MHOP
FOW MISS ### LQ: ##.#
PREC MIN/MAX: R/I

5 kHz DAMA

Network State

- Network is Limited Input/Output (LIO) to data rates less than 2400 bps.
- If “LIO” is not displayed, there are no limits to your Input/Output data rates.

NETWORK STATE

PCC: ##### LIO
FOW MISS ### LQ: ##.##
PREC MIN/MAX: R/I



5 kHz DAMA

Status Messages

 **Use HOT KEY #5** to access the Status Message Menu.

- When Status Messages are received, an “N” will be displayed on the Network screen.
- The PSC-5 stores up to ten messages.
- If two or more identical messages are received consecutively, a counter will increment.
- After a message has been read, a Check mark will appear before the message and the new Status Message indicator (N) will disappear.

NETWORK 5k

Net - Connected **N**

Conn - Rx/Tx

Login


Status Msg **01** of 10

✓ Transmission Inhibited

02

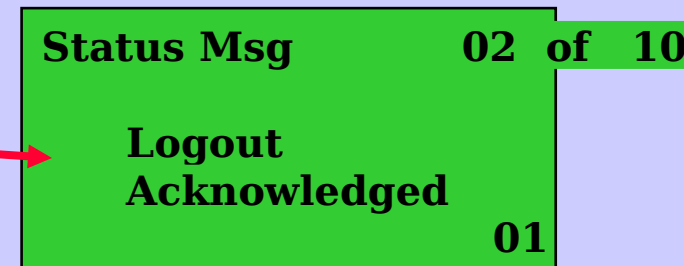
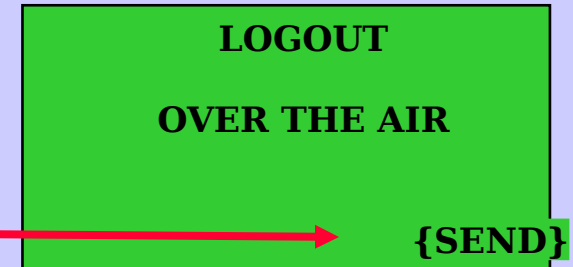
5 kHz DAMA

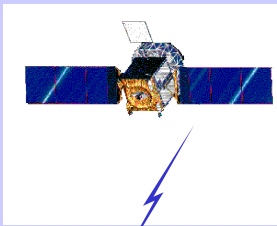
Logout

 Use Hot Key #6 to access the Logout Menu.

- After the Logout request is sent, two events will occur:

- **DAMA Control will send a Status Message acknowledging your Logout request.**
- **The RT will return to an Idle condition.**





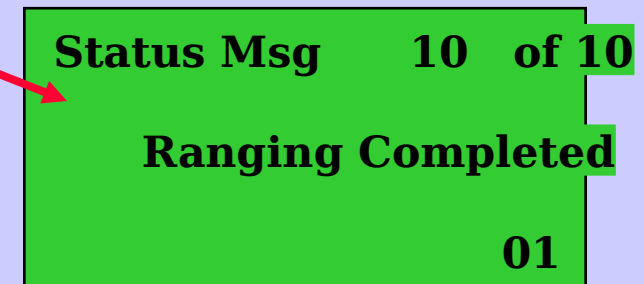
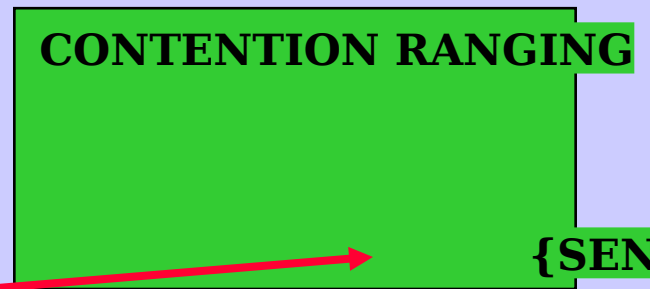
5 kHz DAMA

Contention Ranging



Use Hot Key #7 to
access the Contention
Ranging Menu.

- Contention Ranging is used whenever the operator initiates Ranging.
- Within approximately 30 seconds, a Status Message will be received.
- This is not a pop up Status Message so look for the “N” indicating a new message has been received.



5 kHz DAMA Message Service

Sending a Message (Data Only)



Hot Key

Network 5 kHz
Net - Connected
Idle
8 Message Queue

If RCV (Receive) is showing, use the left/right arrows keys to change to XMIT (Transmit) then press the ENT key.

Receive Message

Message Queue

RCV

0 IN QUE

Send Message

Message Queue

XMIT 0 in Que

TEK1 ANDVT D2400

Prec: R EN D: _____

{SEND}

5 kHz DAMA Message Service

Sending a Message

- Since Message Service is only for Data, the “D” is always displayed.
- The data rate displayed represents the data rate required between the RT and the external I/O data device.
 - The KL-43C/F typically uses 1200 or 2400 bps.
 - The DMDG uses 600 or 1200 bps.
 - The PSC-2A will work at any rate set.
- Ensure the 5kHz DAMA I/O Rate reflect the required data rate of the data device (Hot Keys #2 & #4 from the Main Menu).
- Enter PREC, EN/UN, and Destination then SEND the message transmittal request.

Message Queue

XMIT 0 in Queue

TEK1 ANDVT D2400

Prec: R EN D: _____

{SEND}

The diagram shows a green rectangular box representing a terminal screen. It contains the text 'Message Queue' at the top, followed by 'XMIT 0 in Queue', 'TEK1 ANDVT D2400', 'Prec: R EN D: _____', and '{SEND}' at the bottom. Three red arrows originate from the text instructions on the left: one points from 'the “D” is always displayed' to the 'D' in 'D2400'; another points from 'Enter PREC, EN/UN, and Destination' to the 'PREC: R EN' line; and a third points from 'SEND the message transmittal request' to the '{SEND}' button.


5 kHz DAMA Message Service

Transferring Message from Data Device


- When this message is displayed, activate the “send” command at the attached data device.
- When the RT has stored the message, a Status Message will result.

Message Queue
XMIT 0 in Que
TEK1 ANDVT D2400
Prec: R EN D:15035

Enter Message Now !

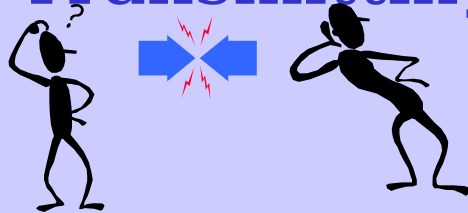


Status Msc ___ of ___
Message Input Complete



5 kHz DAMA Message Service

Negotiating with DAMA Control and Transmitting the Message



- Once the message is buffered, the RT requests service from DAMA Control.
- Once approved, the screen changes to Connected for Rx/Tx and the burst transmission occurs.

NETWORK 5 kHz

**Net - Connected
Conn - Pending
Login**

NETWORK 5 kHz

**Net - Connected
Conn - Rx/Tx
Login**

5 kHz DAMA Message Service

Acknowledgement Messages for Point-To-Point **ONLY**

The DAMA system responds automatically with message acknowledgments.

- The Receiving Terminal gets a Message Received Status Message.
- The Transmitting Terminal gets a Successful Transmission Status Message.
- When the Receiving Terminal releases the message to the data device, the RT automatically sends an Ack. message, resulting in an Ack. Status Message at the sender's RT.
- If the Receiving Terminal does not release the message within 60 sec, a negative "Ack" is received at the Sender's RT.

Status Msg ____ of
Message Received
From: 12345

Status Msg ____ of
Message
From: 12345
To: 12543

Status Msg ____ of
Acknowledge Msg
From: 12345

Status Msg ____ of
Message Terminated
From: 12345 to 12543
No Message Ack

5 kHz DAMA Message Service

Message Complete



- When the Message Service is completed, it is torn down automatically.
- This allows another Service to be established.

NETWORK 5 kHz
Net - Connected
Idle
Login

5 kHz DAMA Message Service

Receiving a Message (with Manual Release)


- The RT will switch to Connected for Rx/Tx.
- The incoming data traffic is Queued (14 kbyte buffer).
- The 5 kHz Network Screen will indicate a new Status Message.
 - **check Status Messages**

NETWORK 5 kHz
Net - Connected
Conn - Rx/Tx
Login

Status Msc ____ of ____
Message Received
From: sssss

5 kHz DAMA Message Service

Reading a Message (with Manual Release)

 **Use Hot Key #8** to
access the **Message
Queue Menu**.

- Presently there are three messages in the Queue.
- Press the ENT key to access the Manual Release Menu.

Network 5 kHz
Net - Connected
Idle
8 Message Queue

Message Queue
RCV **3 IN QUE**


5 kHz DAMA Message Service

Receiving a Message (with Manual Release)


- Queued messages are released in the order they are received.
- Connect an external I/O data device and configure it as necessary to receive the message.
- With the RT's cursor on "{RELEASE}" Press the ENT key to send the message to the attached data device.
- When the data transfer is completed, a Status Message will pop up on the terminal's screen.

Message Queue
RCV 3 in Que
TEK1 ANDVT D2400
Prec: R EN D:12555

{RELEASE}



Status Ms ___ of ___
Message Output Complete



5 kHz DAMA Message Service

- The Network State is Idle
- Receiving a Message (with Auto Release)

- Incoming traffic Connected for Rx/Tx.
- Auto Message Release allows a received data message to be transferred from the RT to an external data device without operator intervention.
- After the message has been received, the Network State returns to Idle.
- If no external data device is connected, the data will be lost.

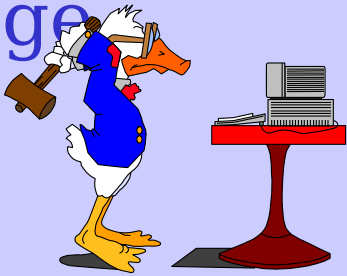
NETWORK 5 kHz
Net - Connected
Idle
Login

NETWORK 5 kHz
Net - Connected
Conn - Rx/Tx
Login

NETWORK 5 kHz
Net - Connected
Idle
Login

5 KHZ DAMA Message Service

Deleting a Queued Message



- Deleting a Queued Message will erase the message from the RT's memory.
- No data will be transfer to an external device from the deleted message.

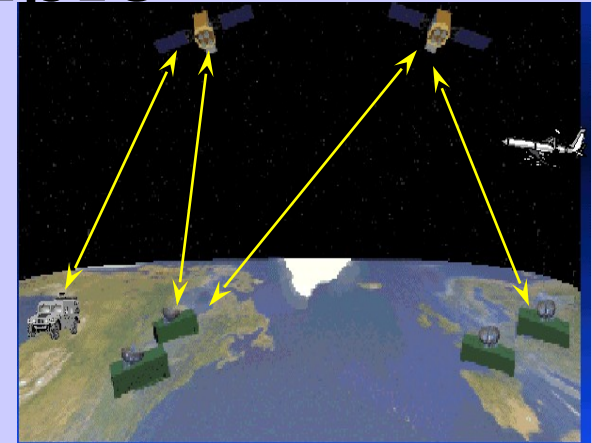
```
Message Queue
RCV          2  IN QUIT
TEK1 ANDVT   D2400
Prec: R EN    D:1255
                {DELETE}
```

25 kHz AC DAMA Operation

25kHz DAMA Pre-Mission Cut Sheet Example

DAMA PRESETS

Parameter	Value	Presets					
		1	2	3	4	5	6
Encryption	VINSON						
	KG-84			x			
Comm	ANDVT	x	x				
	Voice	x					
	Data		x	x			
Data Rates	Vinson	16K					
	ANDVT	75					
		300					
		600					
		1200		x			
		2400	x				
	KG-84	75					
		300					
		600					
		1200					
		2400			x		
		9600					
		16K*					
Channel Variant	5KHz						
	25KHz	x	x	x			
Tpwr (dbm)	23 to 43	43	43	43			
Channel #	1-239 or 999	16	16	16			
Config Code	00 to 99	60	60	60			
OW Encryption	PT						
	CT	x	x	x			
Mode of Operation	Normal	x	x	x			
	EMCON						
	Silent						
	Active	x	x	x			
	Passive						
Ranging	Maint						
	1 to 8						
Satellite ID*	C4-1						



COMSEC Keys

Key #	Type			Update
	ANDVT	VINSON	KG-84	
1		X		0
2	X			2
3			X	1
4			X	4
5	X			5
OTAR				*

25kHz DAMA Pre-Mission

Cut Sheets Example

Orderwire Keys

Orderwire Key Position	Orderwire Key Name
1	USXXX1122
2	USXXX1123

Guard List

Guard Address #	Guarded Address
1	12001
2	12002
3	12003
4	16333
5	15299

SATELLITE EPHEMERIS

Satellite ID		1	2	3	4	5	6	7	8
LON	E	Deg							
		Min							
		Sec							
	W	Deg							
		Min							
		Sec							
Ascension Time	Hrs								
	Min								
Inclination Angle	Deg								

TERMINAL DATA

Terminal Address			12000
LAT	N	Min	
		Sec	
	S	Min	
		Sec	
LON	E	Min	
		Sec	
	W	Min	
		Sec	
Terminal Time	Hrs		
	Min		
Platform	Stationary		
	Mobile		
Msg Release	Auto		NA
	Manual		NA

CURRENT MODE

- Select the desired DAMA Preset # on the Current Mode screen and press the ENT key.
- Use the PREV Key or the NEXT Key to reach the “Network...” field.
- With the cursor resting on the word “Network...”, press the ENT key.
- The Screen’s top line will change to “CONFIGURING: WAIT.”

The diagram shows a green rectangular screen titled "CURRENT MODE". The screen displays the following text: "DAMA - P1", "Sq-", "TEK 1 PSK ANDVT", "2400z", "Tpwr", "Channel", "R 253.850", "T", "Code: 060", "Normal Range:", and "Network...". A red arrow points from the text "Select the desired DAMA Preset # on the Current Mode screen and press the ENT key." to the "DAMA - P1" line. Another red arrow points from the text "Use the PREV Key or the NEXT Key to reach the 'Network...' field." to the "Network..." line. To the right of the screen, a blue line connects the "Sq-" field to the value "-025". Below this, a yellow circle labeled "PREV" is connected to the "Network..." field by a blue line with an arrow pointing left.

CURRENT MODE

DAMA - P1 Sq- -025

TEK 1 PSK ANDVT

2400z Tpwr

Channel

R 253.850 T

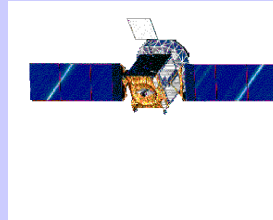
Code: 060

Normal Range:

Network...

PREV

Acquisition



- The RT begins to receive the downlink signal from the satellite.
- The RT synchronizes with DAMA Control and the Satellite.
- Once ranging has successfully completed, the RT is ready to proceed with DAMA access.

Network 25 kHz AC
NET - Acquiring
Conn - Idle
Send Stat

Network 25 kHz AC
NET - Ranging
Conn -
Send Stat

Network 25 kHz AC
NET - Connected
Conn - Idle
Send Status B

Notification and Acknowledgement

Sending Status B informs the controller of the terminal's configuration.

- DAMA Control will acknowledge receipt of your Status B message.

SEND STATUS B

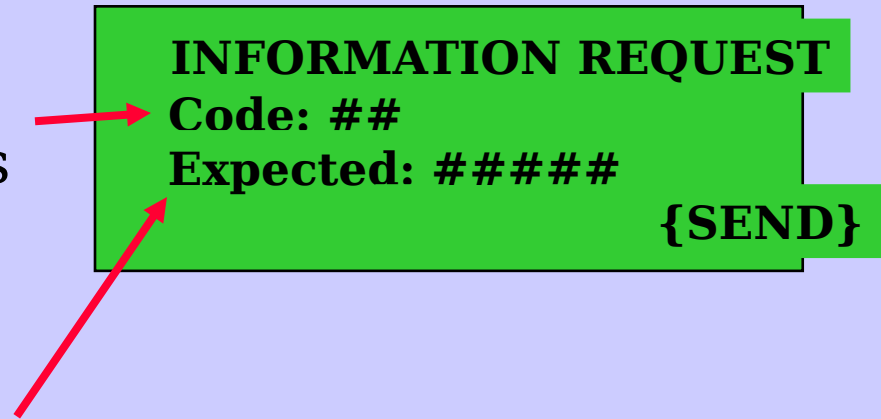
{SEND}

Status Message of

**Status Report
Request
Acknowledged**

Information Codes

- If the controller requires more details, it initiates an Information Request.
- The Information Request Code identifies the details requested.
- If programmed, the appropriate Expected Response Code will appear for Operator action; if acceptable, SEND.



Menu Options

Send Status B

1. Service Setup
2. Teardown
3. Service State
4. Network State
5. Status Messages
6. Data Transfer
7. Link Test
8. Paging
9. Out Serv

Service Setup

- The terminal is ready to set up a service.
- The screen will display various symbols, such as:

- **N** = New Msg Received
- **M** = Missed Orderwire
- **↑** = Outgoing OrderWire
- **↓** = Incoming OrderWire
- **↕** = Concurrent OrderWires.



Use Hot Key #1
to access Service Set

NETWORK 25kHz AC
Net - Connected ↓
Conn - Idle ↘
1. Service Setup

- Possible variations of the type of connection (CON -) are:

Conn - Rx/Tx = Half Duplex
Operation

Conn - Rx = Receive Only
service

Idle - No Connection

Service Setup (continued)

Operator enters:

- The Service Precedence.
- Terminal and/or Network addresses to which the service will be connected.
- The duration of the service (00-59).
- Selects the time duration (sec, min, hrs, days, or indf).

SERVICE SETUP

Prec: R

#####, #####, #####
#####, #####, #####

MIN **{SEND}**

The diagram shows a green rectangular form titled 'SERVICE SETUP'. It contains four main input sections. Red arrows point from the list items to these sections: the first arrow points from 'The Service Precedence' to the 'Prec:' field; the second arrow points from 'Terminal and/or Network addresses' to the two lines of '#####' fields; the third arrow points from 'The duration of the service' to the '## MIN' field; and the fourth arrow points from 'Selects the time duration' to the '{SEND}' field.

Service Request/ Acknowledgement

- When the Service request is sent, an Up Arrow will appear on the Network 25 kHz AC Menu indicating an outgoing OW message.
- When a Down Arrow appears, indicating an OW message is being received .
- This is the resulting Status Message.

Network 25 kHz AC

NET - Connected → **N↑**
Conn - Idle
Send Status B

Network 25 kHz AC

NET - Connected → **↓ I**
Conn - Rx/Tx
Send Status B

Status Msg ____ **of** ____

**Service Request
Acknowledged**

Communications

- At this point the AN/PSC-5 is ready for communications.
- Press the ESC key to return to the Current Mode Menu (if desired) to observe Rx/Tx status.

NETWORK 25 kHz AC

Net - Connected
Conn - Rx/Tx
Send Status B

**CURRENT
MODE**

DAMA -

TEK 1 PSK ANDVT

25 kHz

43 dbm

Tx-CT-133

Rx-CT-034

Tpwr

Modifying Current Mode

The only field that can be changed without prior coordination is “Tpwr.”

CURRENT MODE	
DAMA - M1	Sa- -C
TEK # PSK ANDVT V 240	
25 KHz	Tpwr 43

Channel ###	
R: ###.###	T: #
Code: ##	OW
Normal Range: Active	
Network.....	

Modifying Current Mode

With Controller Notification

- If Data Rate, Encryption Type, or Configuration Code is changed, you must send a new Status B message to DAMA Control.
- Re-initialize the RT by selecting “Network...” and wait for the “CONFIGURING: WAIT” message to clear.
- When the Network 25kHz AC Menu appears, send the new Status B message.

CURRENT MODE

DAMA	- M1	Sa-	- 000
TEK #	PSK ANDVT	V	2400
25KHz			Tpwr 43 db

Channel ###

R: ###.###

T: ###

Code: ##

OW: C

Normal Range: Active

Network

...

Network 25kHz AC

NET - Connected

Conn - Rx/Tx

Send Status B

Dedicated Channel Operation (DASA)

- Change the fields indicated:
 - **Optional**
 - TEK #
 - Encryption Type
 - Voice or Data
 - **Required**
 - Data Rate (16k, 9.6k, 2400, 1200)
 - Configuration Code (99, 98)
- Re-initialize RT by selecting "Network... "; wait for "CONFIGURING: WAIT" to clear
- When Network 25kHz AC screen appears, send a Status B.

CURRENT MODE

DAMA - M1 **Sa- -000**

TEK # **PSK ANDVT** **V** **2400**

25KHz **TPwr 43 dbm**

Channel ###

R: ###.### **T: ###.###**

Code: ## **OW: CT**

Normal Range: Active

Network

...

Network 25kHz AC

NET - Connected

Conn - Rx/Tx

Send Status B

DASA Operation

Service Setup

- Operator (NCS) enters:
 - The Service Precedence.
 - Terminal and/or Network addressees to which service will be extended.
 - The duration of the service (0-59 sec/min/hrs/days or indf).

SERVICE SETUP	
Prec: R	
#####	#####, #####, #####,
#####	#####, #####, #####,

## MIN	{SEND}

DASA Operation

Timed Connection

- **Dedicated or DASA Channels are timed connections. Time periods are:**

- seconds
- minutes
- hours
- days



- **Connection Teardown may be automatic or manual**

- Automatic Teardown is done when time expires.
- Manual Teardown is performed by selecting **HOT Key #1** before time expires.


NETWORK 25k Dedicated

NET - Connected N
Conn 10 Mins
1. Teardown

TEARDOWN

{SEND}

25 kHz DAMA Service Teardown

 **Use Hot Key #2** on the 25 kHz Network Menu to Teardown a service.

- Teardown allows you to terminate your local terminal's active service.
- Once the service is torn down, the Network screen will indicate an Idle state.

TEARDOWN

{SEND}

NETWORK 25kHz AC
Net - Connected
Idle
Send Status B

Service State

 **Hot Key**

SE#3VICE STATE

**Conn - Rx/Tx
15001, 15002**

Network State

 **Hot Key #4**

NETWORK STATE

Ctrl:	Auto
CCOW miss	###
Prec Min:	R

Status Messages

 **Hot Key #5**

Status Msg 01

of 10

**Transmission
Inhibited**

02

Data Transfer

 **Hot Key #6**
to transmit

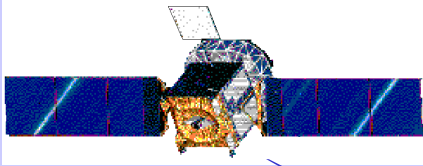
Status Message
Pops up when received.

DATA TRANSFER
Prec: R
Party: #####
Data:

###, ###, ###, ###
{SEND}

Status Message of
Data From: #####
###
R

Link Test




Use Hot Key #7
to perform a Link Test

**The operator selects
the Burst Rate.**

LINK TEST

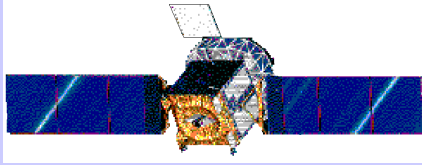
Rate: ### kbps

{SEND}

Burst Rate (kbps)	Time to Complete (min)
9.6	6 to 7
19.2	2
32	1

Link Test

(continued)



- While the Link Test is being conducted, the display will be flashing the letter “M.”
- When the Link Test is completed, a pop-up message will appear.
- Test results for reliable communications:
 - Symbol Errors:
 - < 30 for Data
 - < 100 for Voice
 - Valid range 0 - 32,767
 - Missed Acq should be 0.
(Range is 0 to 139)

NETWORK 25kHz AC
Net - Connected
Conn - Rx/Tx
1. Service Setup

M

Status Msg 03 of 10

KBPS Link Test
Symbol Err: #####
Missed Acq: ###
01

Paging



Use Hot Key #8

to access the Paging function

- Enter the Terminal Addresses as required then SEND the request.
- DAMA Control will respond with a Paging Request Status Message.
- The Paged Terminal(s) will receive a Paging Status Message.

PAGING

#####, #####, #####
{SEND}

Status Msg 10 of 10

**Paging
Request
Acknowledged**

Status Msg 10 of 10

**Call Waiting
Party: ##### Prec:
Routine**

Out-of-Service Request

- Enter your estimated Out-of-Service time in sec/min/hrs/ days or indf.
- Return to the service within the estimated time period or Teardown your service.


Use Hot Key #9
to send an
Out-Of-Service

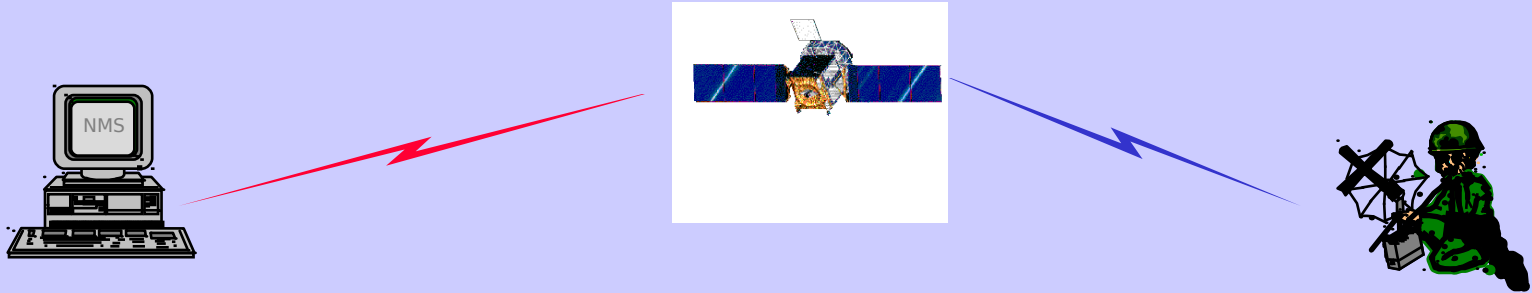
OUT-OF-SERVICE
Prec: R
Reason: ## ## MI
{SEN

DAMA Service Requests

<i>5 kHz DAMA</i>	<i>25 kHz AC DAMA</i>	<i>Dedicated (DASA)</i>
Login 1-Service Setup 2-Teardown 3-Service State 4-Network State 5-Status Messages 6-Logout 7-Contention Ranging 8-Message Queue	Send Status B 1-Service Setup 2-Teardown 3-Service State 4-Network State 5-Status Messages 6-Data Transfer 7-Link Test 8-Paging 9-Out Serv	1-Teardown 2-Status Messages

25 kHz DC DAMA Operations

Acquisition



- The RT begins to receive the downlink signal from DAMA Control.
- DAMA Control switches your DAMA mode to DC.
- The RT synchronizes with DAMA Control and the satellite.
- Once ranging has been successfully completed, the RT is ready to proceed with 25 kHz DC DAMA operations.

Network 25kHz AC
NET - Acquiring
Idle
Send Status B

Network 25kHz DC
NET - Ranging
Idle
1. Service Setup

Network 25kHz DC
NET - Connected
Idle
1. Service Setup

Menu Options

NETWORK 25kHz DC

- 1. Service Setup**
- 2. Teardown**
- 3. Service State**
- 4. Network State**
- 5. Status Messages**
- 6. Data Transfer**
- 7. Link Test**

Service Setup

- The terminal is ready to set up a service.
- **Select Hot Key #1 (Service Setup)**
- Enter the Circuit ### provided by Communications Planner or from the CUT Sheet.
- SEND the request.
- Display changes to the Network 25 kHz DC Menu with Rx/Tx indicated.

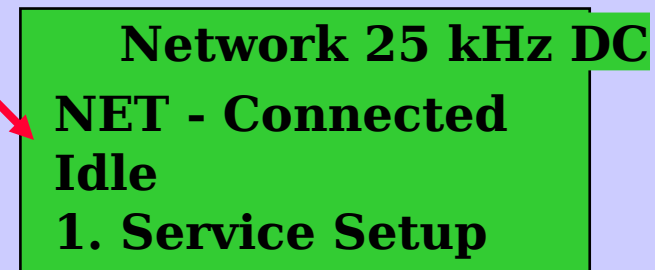
Network 25 kHz DC
NET - Connected
Idle
1. Service Setup

SERVICE SETUP
Circuit Number: ###
{SEND}

Network 25 kHz DC
NET - Connected
Rx/Tx
1. Service Setup

Teardown

- Enter the Circuit Number and SEND the request.
- When the Circuit is torn down, the 25 kHz DC Network screen will remain connected in an Idle condition.
- At this time either:
 - reestablish a new Circuit,
 - change to another mode of communications (LOS, SATCOM, 5kHz DAMA), or
 - turn the RT off.



Service State



**Hot Key
#3**

SERVICE STATE

Connect Circuit: ###

Network State

 **Hot Key**
#4

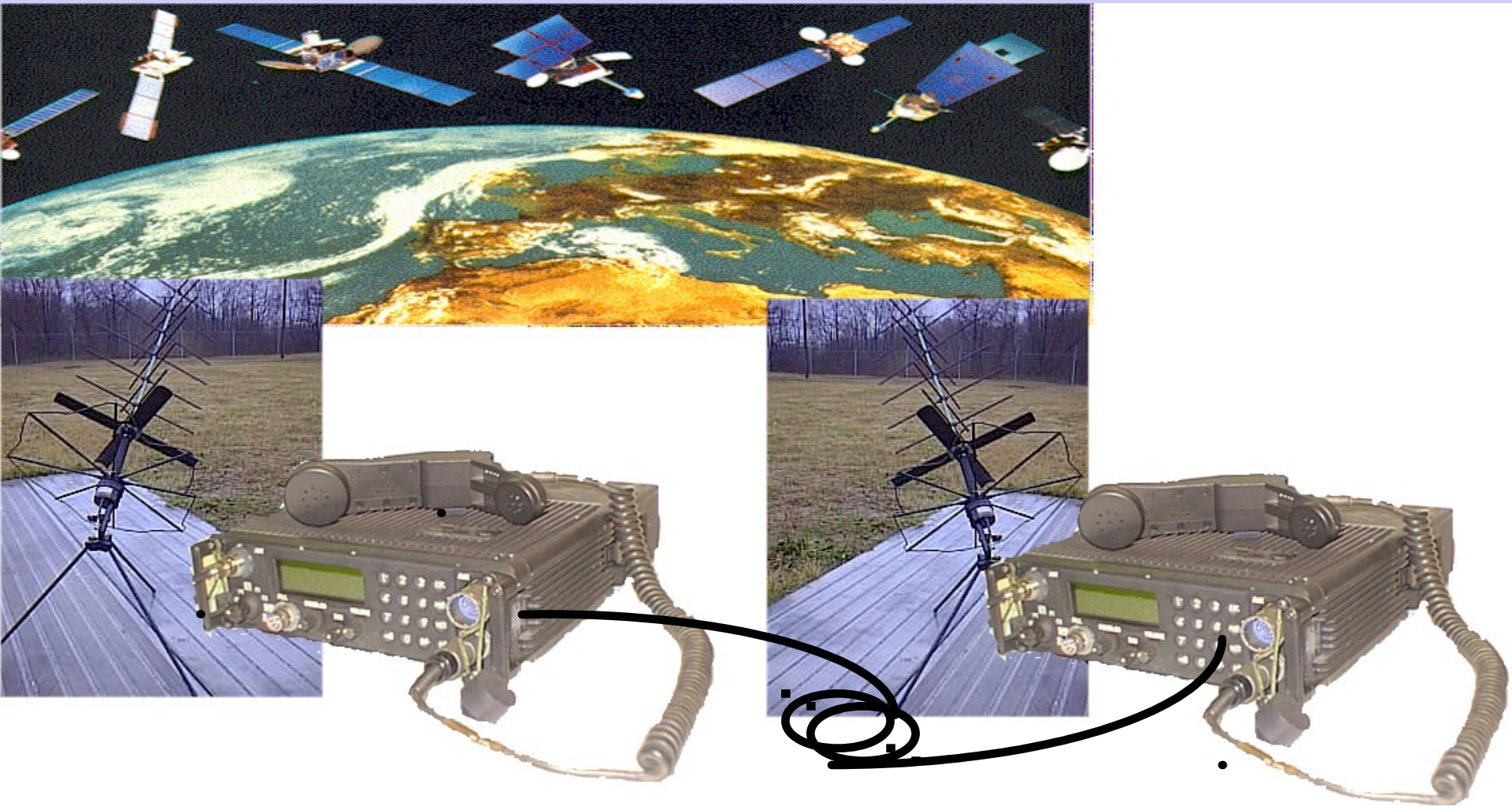
NETWORK STATE

CTRL: DISTRIBUTED
CCOW Misses ###

Other SPITFIRE Operations

Retransmission

AN/PSC-5 to AN/PSC-5



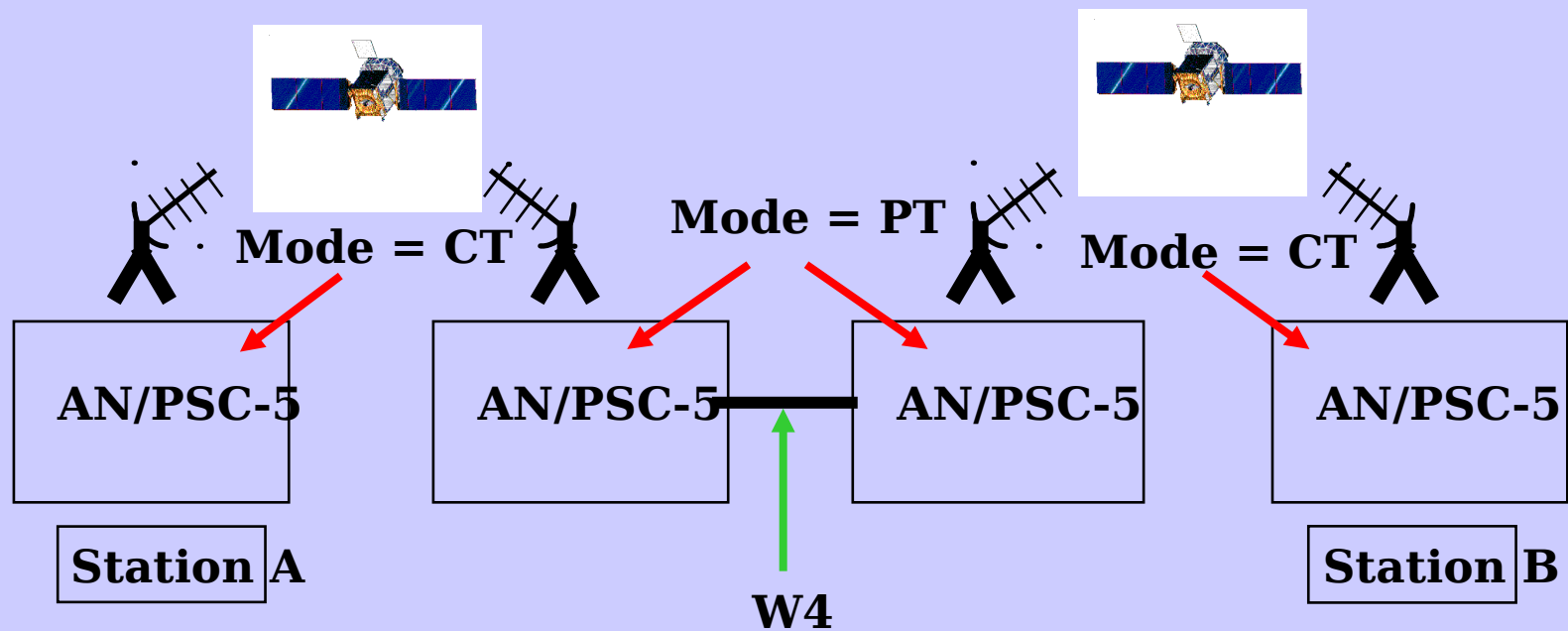
Retransmission

AN/PC-5 to AN/PSC-5 (continued)

- **Retransmission may use:**
 - LOS
 - Narrow or Wide Band SATCOM
 - 5 kHz or 25 kHz DAMA.
- **Connect the retransmit cable (W4) between the RT AUX connectors. Separate the RTs to fullest extent possible.**
- **Set the mode switch on both RTs to PT.**
 - Encryption supplied by the source and destination radios.
- **Select the desired preset for both RTs.**
 - Both RTs must be on different frequencies/channels.
- **The RTs are ready for retransmit operations.**

Retransmission

AN/SC-5 to AN/PSC-5 (continued)



Retransmission

AN/PSC-5 to SINCGARS



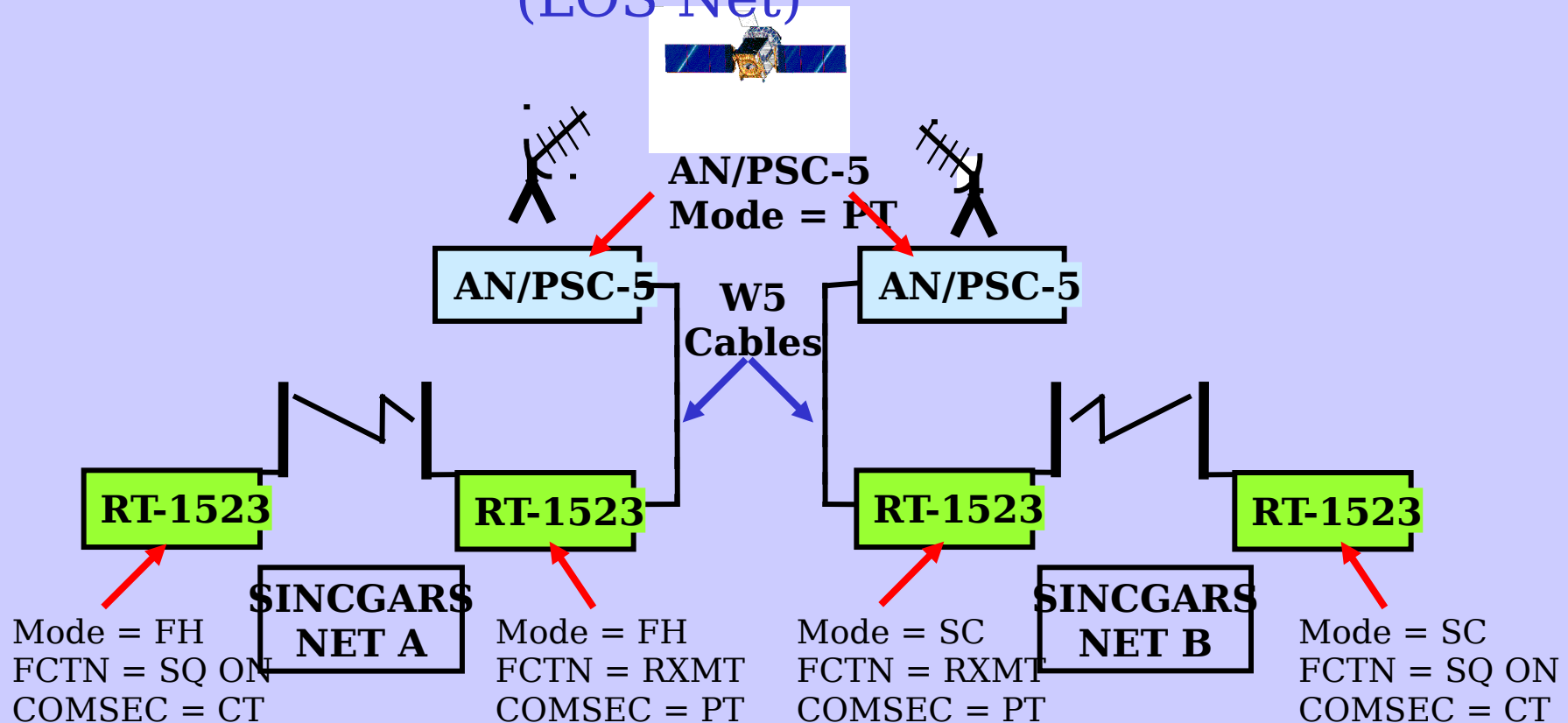
Retransmission

AN/PSC-5 to SINCGARS (continued)

- Retransmission may use:
 - analog voice (LOS only)
 - 16 kbps digital (voice or data) using LOS or Wideband SATCOM.
- Connect the RXMT Cable, W5.
- Separate the antennas by the full length of the cables.
- Set-up the radios for retransmit operations.

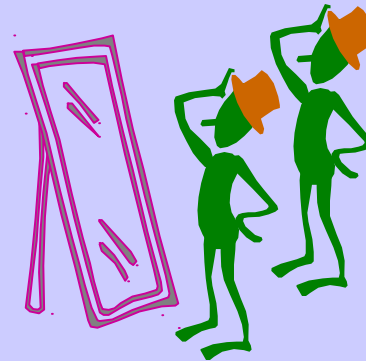
Retransmit

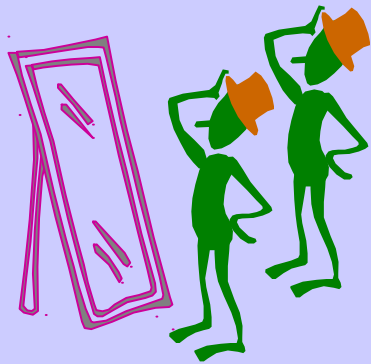
SINGARS to SINGARS (LOS Net)
through AN/PSC-5 to AN/PSC-5
(SATCOM) to SINGARS to SINGARS
(LOS Net)



AN/PSC-5 to AN/PSC-5 Cloning

- Parameters Cloned:
 - LOS, SATCOM, DAMA, and BEACON Presets.
- Parameters Not Cloned:
 - COMSEC/OrderWire keys, Satellite Ephemeris, Terminal Data, Guard Addresses, 5 kHz I/O Rates, and 25 kHz Response Codes.
- W7 Cable required (not included with each RT).





AN/PSC-5 Cloning (continued)

- You must perform the same steps on both RTs.



Use Hot Key #2 on the Main Menu.



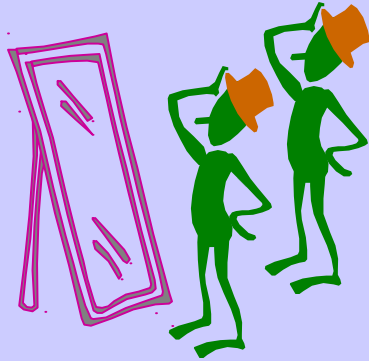
Use Hot Key #8 on the Database Menu.

MAIN MENU

1. - CURRENT MODE
2. - DATABASE OPTIONS
3. - SET PRESETS
4. - BIT OPTIONS
5. - MAINTENANCE

DATABASE MENU

1. - STATUS MSG
2. - GUARD LIST
3. - TERMINAL DATA
4. - 5kHz I/O RATES
5. - SAT EPHEMERIS
6. - INFO CODES
7. - COMSEC KEY STATES
8. - CLONE MODE

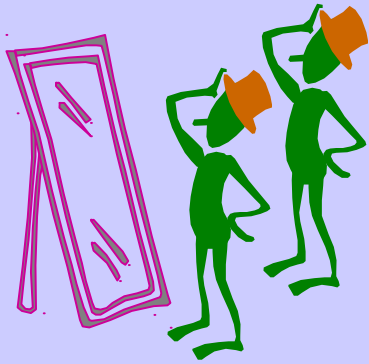


AN/PSC-5 Cloning (continued)

Press the ENT key
to initiate the
Cloning sequence.

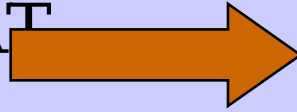
CLONE MODE

{SEND}



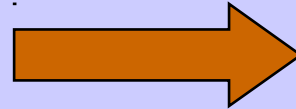
AN/PSC-5 Cloning (continued)

- The Destination RT will display



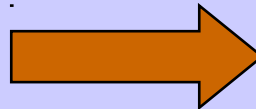
CLONE MODE
Receive
In Progress

- The Source RT will display



CLONE MODE
Transfer
In Progress

- When Cloning is completed, both RTs will display



CLONE MODE
Successful
ENT to Continue

AN/PSC-5 Interoperability

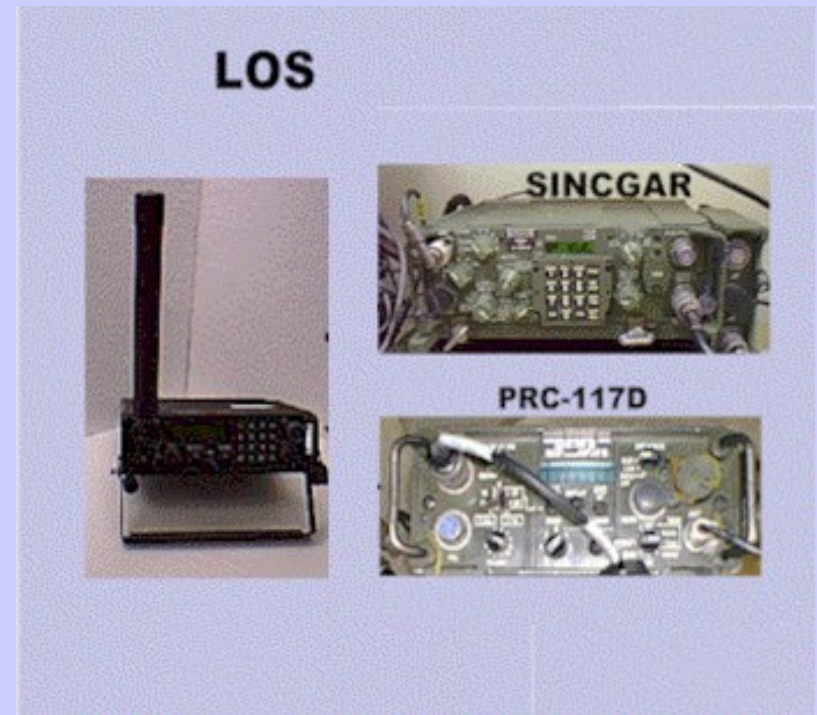
AN/PSC-5 Interoperability

- Required by Specification
 - Line of Sight (LOS)
 - SATCOM
 - DAMA



Line of Sight

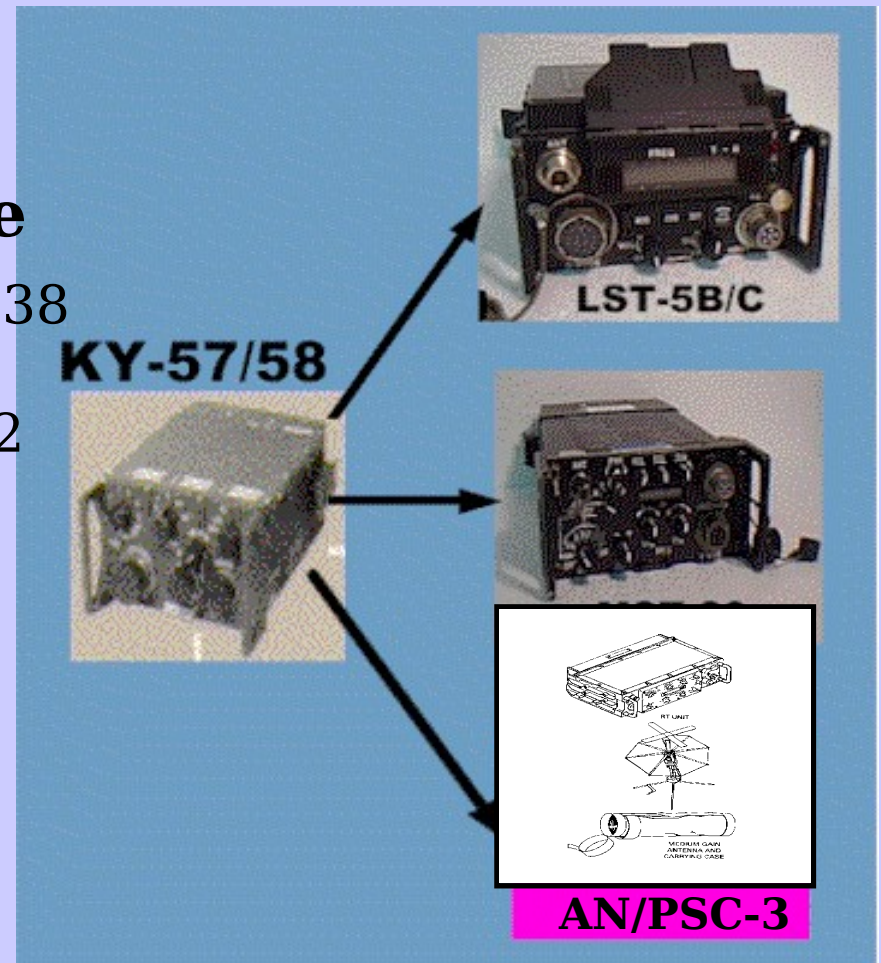
- Required:
 - SINCGARS
- Not required, but works
 - Sabre RT
 - AN/PRC-117D (Vinson Mode)



SATCOM

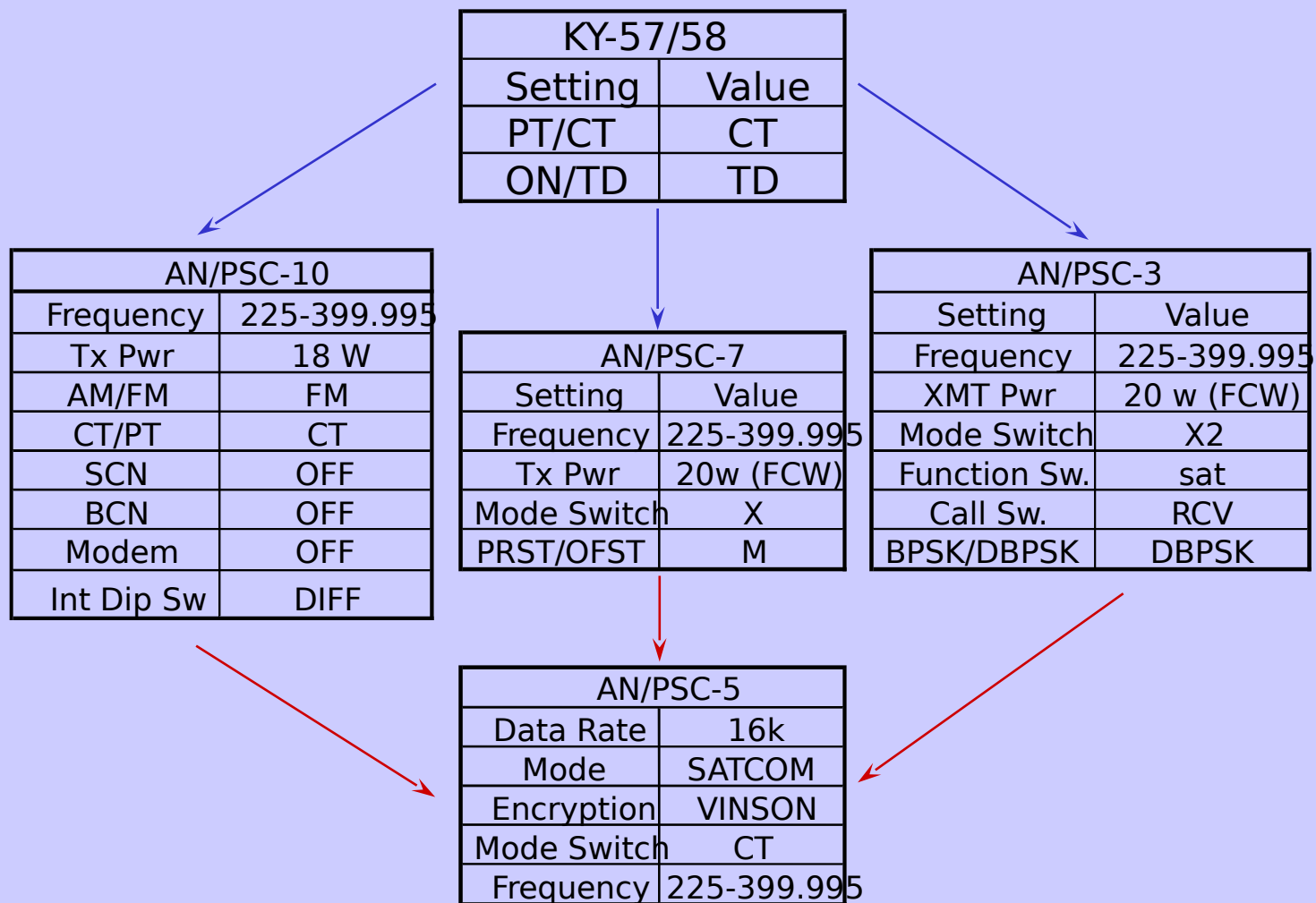
KY-57/58

RT	X-MODE Cable
AN/PSC-10 (LST-5B/C)	Tracor # 29357-4638 Motorola # PTKY- 10430-P27585D002
AN/PSC-7 (MST-20)	CX-12991/U
AN/PSC-3	CX-12991/U



SATCOM

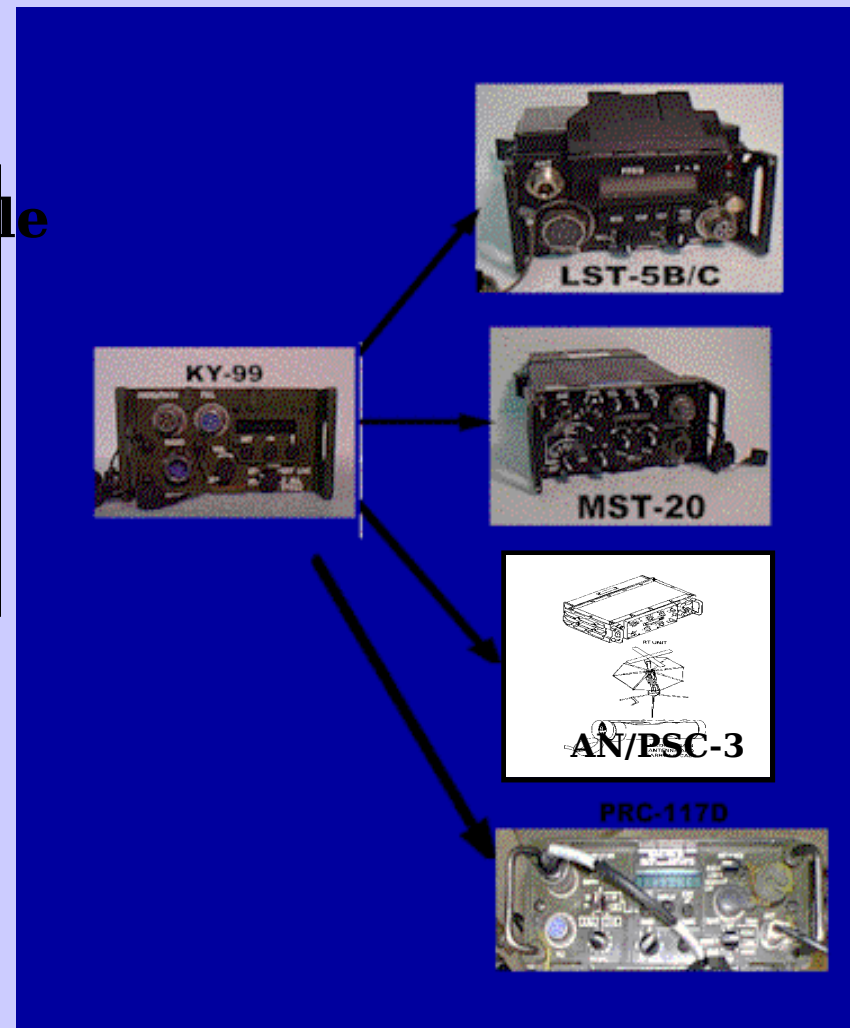
KY-57/58 (continued)



SATCOM

KY-99

RT	X-MODE Cable
AN/PSC-10 (LST-5B/C)	Commercial
AN/PSC-7 (MST-20)	CX-13439/U
AN/PSC-3	CX-13439/U
AN/PRC-177D	Commercial



SATCOM

KY-99

(continued)

KY-99 Narrow Band			
	Settings		Values
Mode Switch Off-Line INFC	RDPOL		MARK +
	BLK DIG	CLKS	INT CLK
		TNG SEQ	9
		DELAY	295 ms
		BD POL	MARK +
		BD CTS	OFF
		MILSTAR	OFF
Mode Switch (CT) On-Line	NET/PTP		NET
	DATA RATE		2400
	TEK (1-6)		as required

KY-99 to Radios (NB)

AN/PSC-10	
Setting	Value
Frequency	225-399.995
Tx Pwr	18 W
AM/FM	FM
CT/PT	CT
SCN	OFF
BCN	OFF
Modem	ON 24
Int Dip Sw	DIFF

AN/PSC-3	
Setting	Value
Frequency	225-399.995
XMT Pwr	20 w (FCW)
Mode Switch	2400
Function Sw.	SAT
Call Sw.	RCV
BPSK/DBPSK	DBPSK

AN/PSC-7	
Setting	Value
Frequency	225-399.995
Tx Pwr	20w (FCW)
Mode Switch	D2.4
PRST/OFST	M

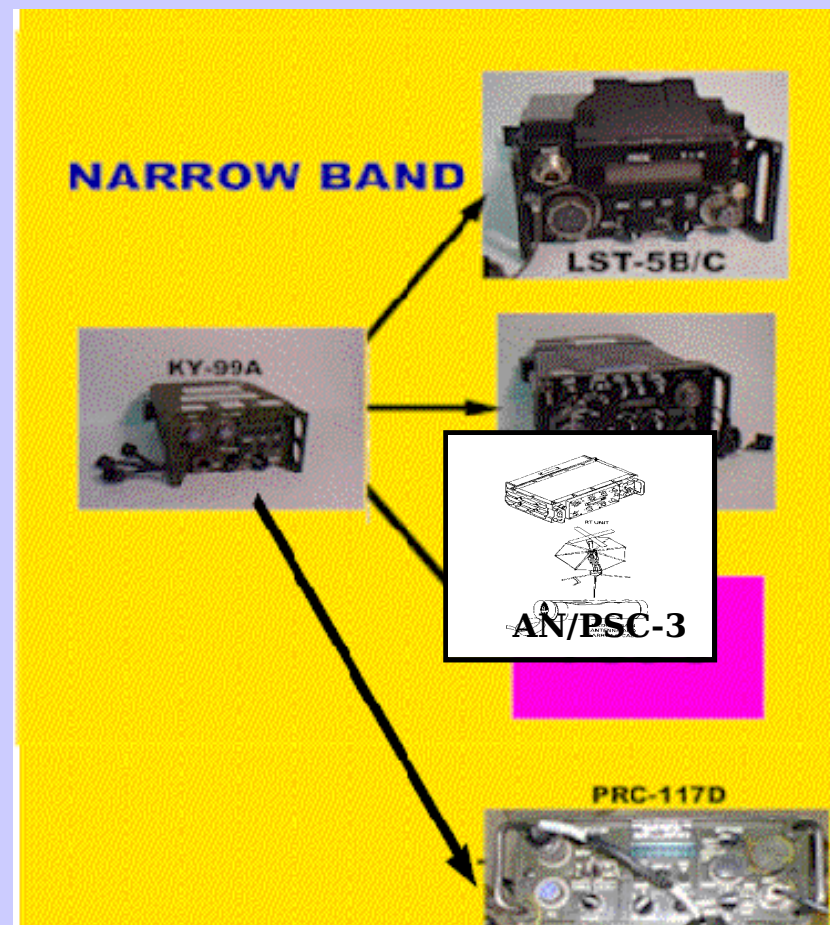
AN/PSC-5	
Setting	Value
Preamble	PSC-5
Encoding	DIFF
Data Rate	2400
Mode	SATCOM
Encryption	ANDVT
Mode Switch	CT
Frequency	225-399.995

SATCOM

KY-99A (NB)

RT	X-MODE Cable
AN/PSC-10 (LST-5B/C)	Tracor# 46923-202047
AN/PSC-7 (MST-20)	Tracor# 4623-001052
AN/PSC-3	Tracor# 4623-001052
AN/PRC-177D	Commercial

AN/PRC-177D



SATCOM

KY-99A (NB) (continued)

KY - 99A Narrow Band				
	Settings			Values
Mode Switch Off-Line	CONFIG			ANDVT
	INFC	RDPOL		MARK +
		BLK DIG	CLKS	INT CLK
			TNG SEQ	9
			DELAY	295 ms
			BD POL	MARK +
			BD CTS	OFF
			MILSTAR	OFF
			PREAMB	STAND (99A)
Mode Switch (CT) On-Line	NET/PTP			NET
	DATA RATE			2400
	TEK (1 - 6)			as required

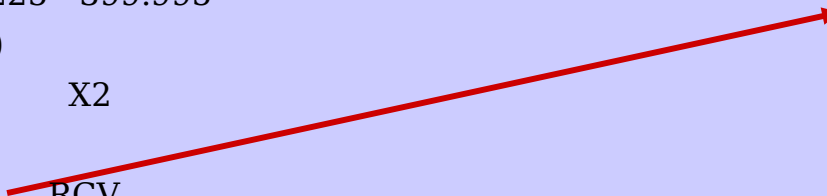
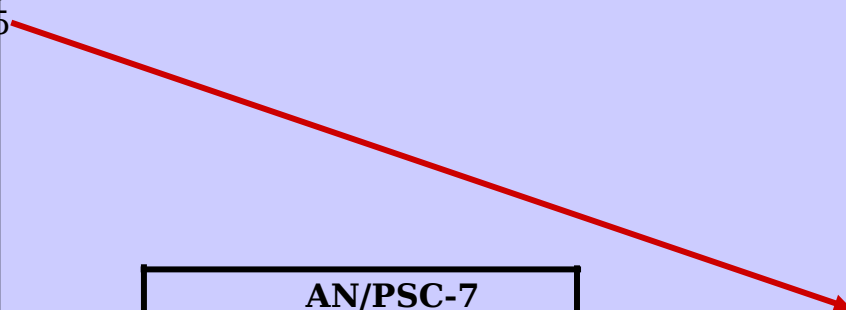
Radio Settings using the KY-99A (NB)

AN/PSC-10	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	18W
AM/FM	FM
CT/PT	CT
SCN	OFF
BCN	OFF
Modem	ON 24
Int Dip Sw	DIFF

AN/PSC-3	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	20W (FCW)
Mode Switch	
Function Sw.	SAT
Call Switch	
BPSK/DBPSK	

AN/PSC-7	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	20W (FCW)
Mode Switch	
PRST/OFST.	M

AN/PSC-5	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	18W (MAX)
Mode Switch	
Preamble	PSC-5
Encryption	
Encoding	
Data Rate	
Mode	SATCOM



225 - 399.995

D 2.4

X2

RCV

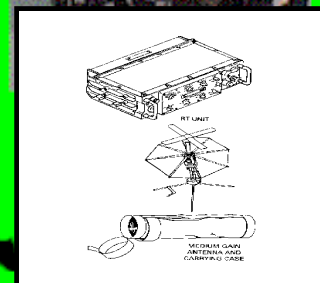
DBPSK

SATCOM

KY-99A (WB)

RT	X-MODE Cable
AN/PSC-10 (LST-5B/C)	CX-13508/U
AN/PSC-7 (MST-20)	Tracor# 46923-202058
AN/PSC-3	CX-13508
AN/PRC-177D	Commercial

WIDE BAND



AN/PSC-3

SATCOM

KY-99A (WB) (continued)

KY-99A Wide Band			
	Settings		Values
Mode Switch Off-Line	CONFIG		VINSON
	INFC	RDPOL	MARK +
		PT LVL	-21
		RATE	16k
		MODEM	BASE BAND
		PHASEIN	298ms
Mode Switch (CT) On-Line	V/VT		VT
	AV/AD/RATE		AV 16k
	TEK (1 - 6)		as required

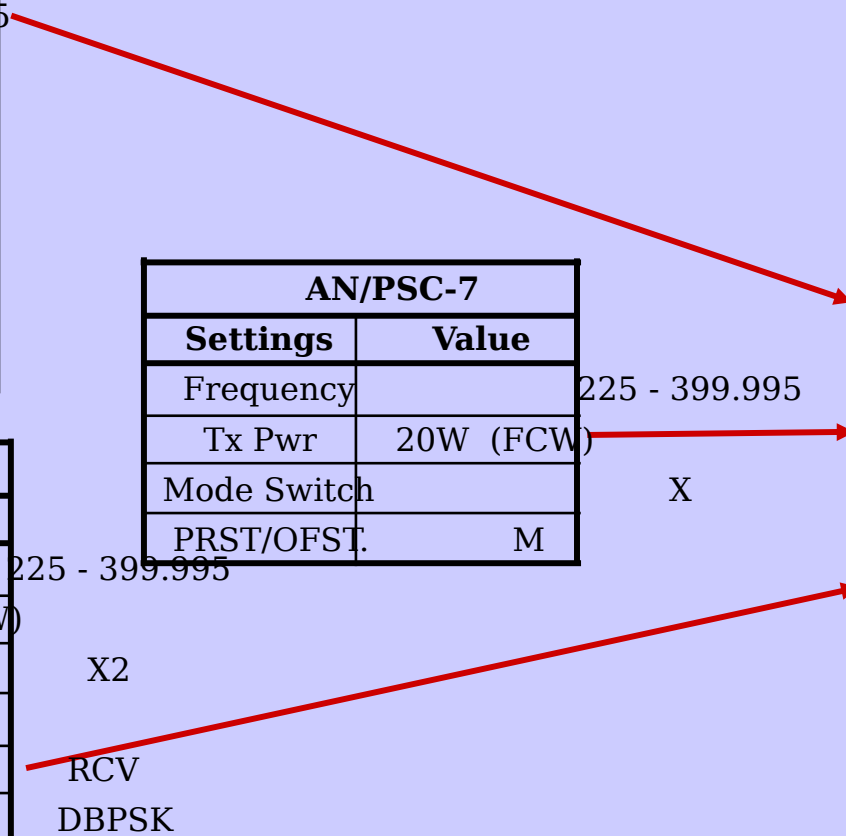
Radio Settings using the KY-99A (WB)

AN/PSC-10	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	18W
AM/FM	FM
CT/PT	CT
SCN	OFF
BCN	OFF
Modem	OFF
Int Dip Sw	DIFF

AN/PSC-3	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	20W (FCW)
Mode Switch	
Function Sw.	SAT
Call Switch	
BPSK/DBPSK	

AN/PSC-7	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	20W (FCW)
Mode Switch	
PRST/OFST.	M

AN/PSC-5	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	18W (MAX.)
Mode Switch	CT
Preamble	PSC-5
Encryption	
VINSN	

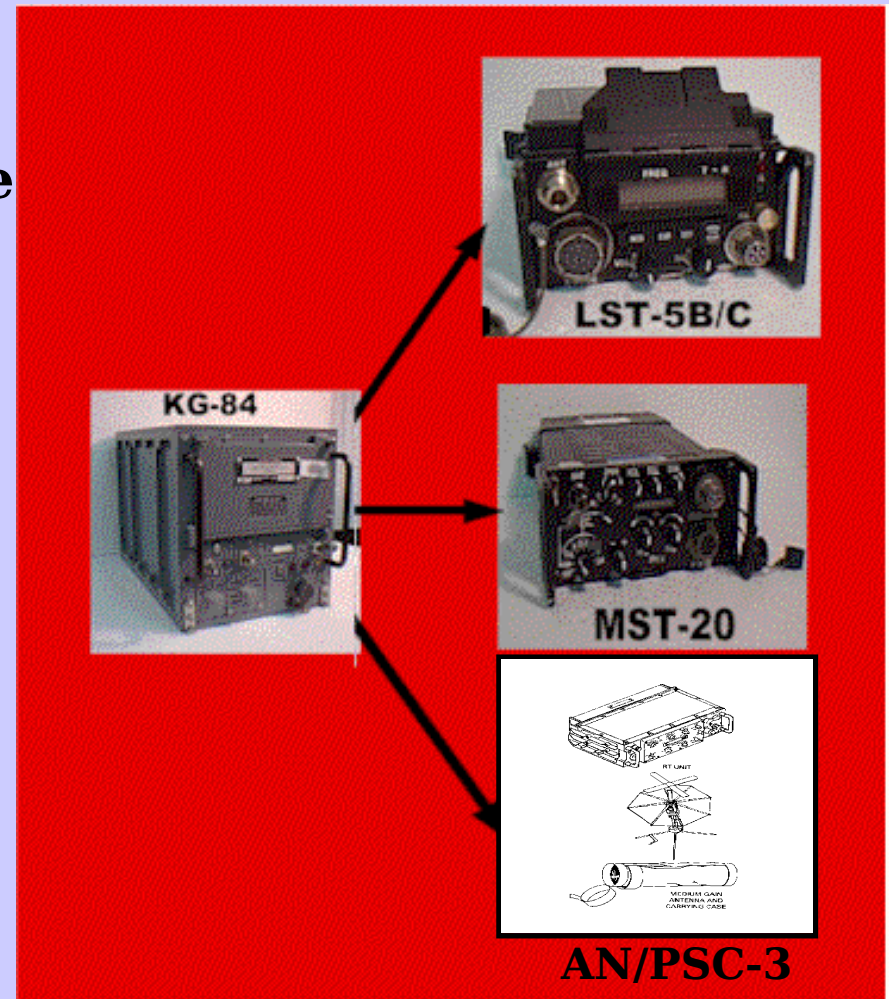


SATCOM

KG-84

RT	X-MODE Cable
AN/PSC-10 (LST-5B/C)	Commercial
AN/PSC-7 (MST-20)	CX-13508/U
AN/PSC-3	CX-13508/U
AN/PRC-	NA

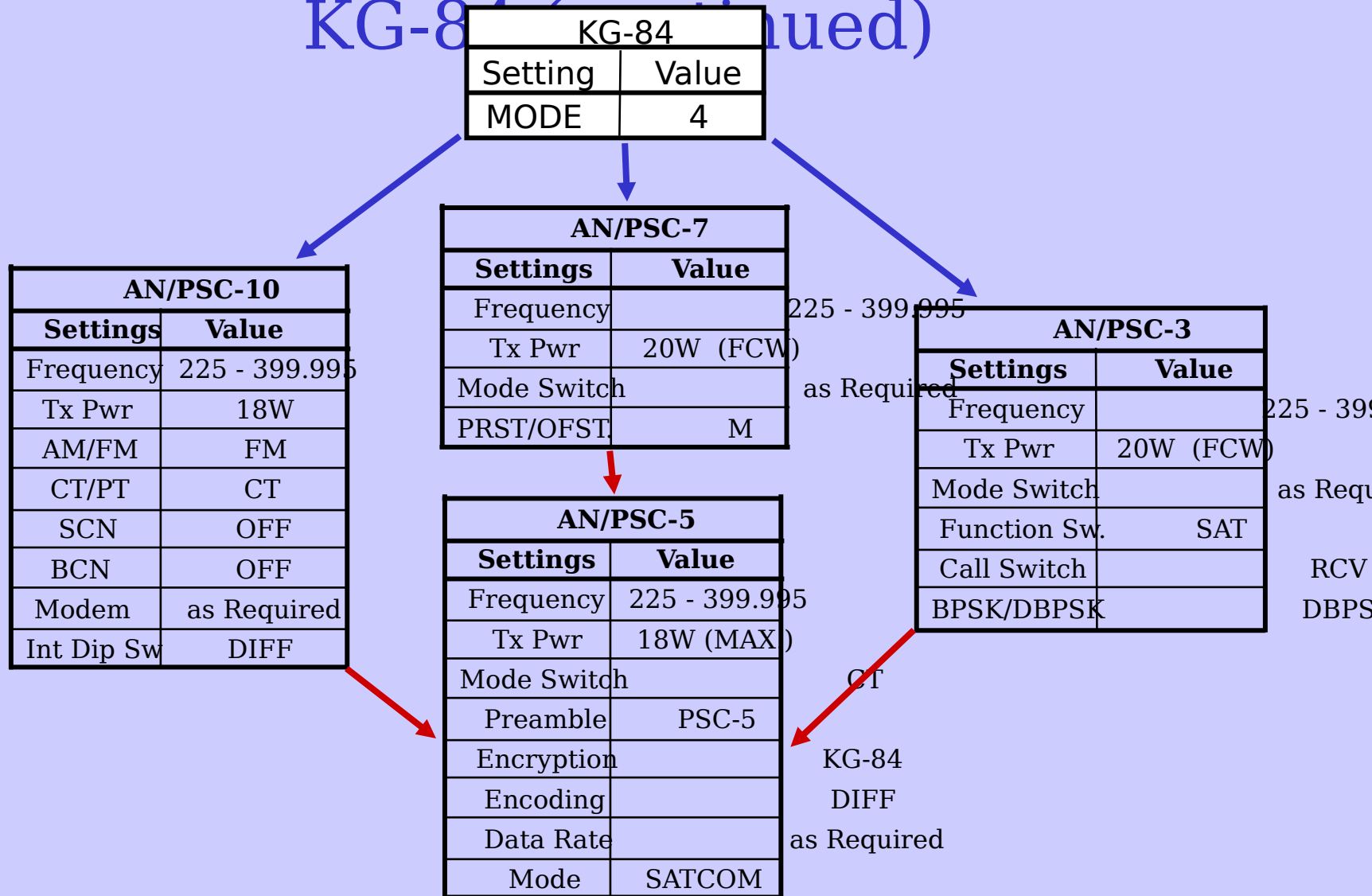
177D



Radio Settings

using the

KG-84 (continued)



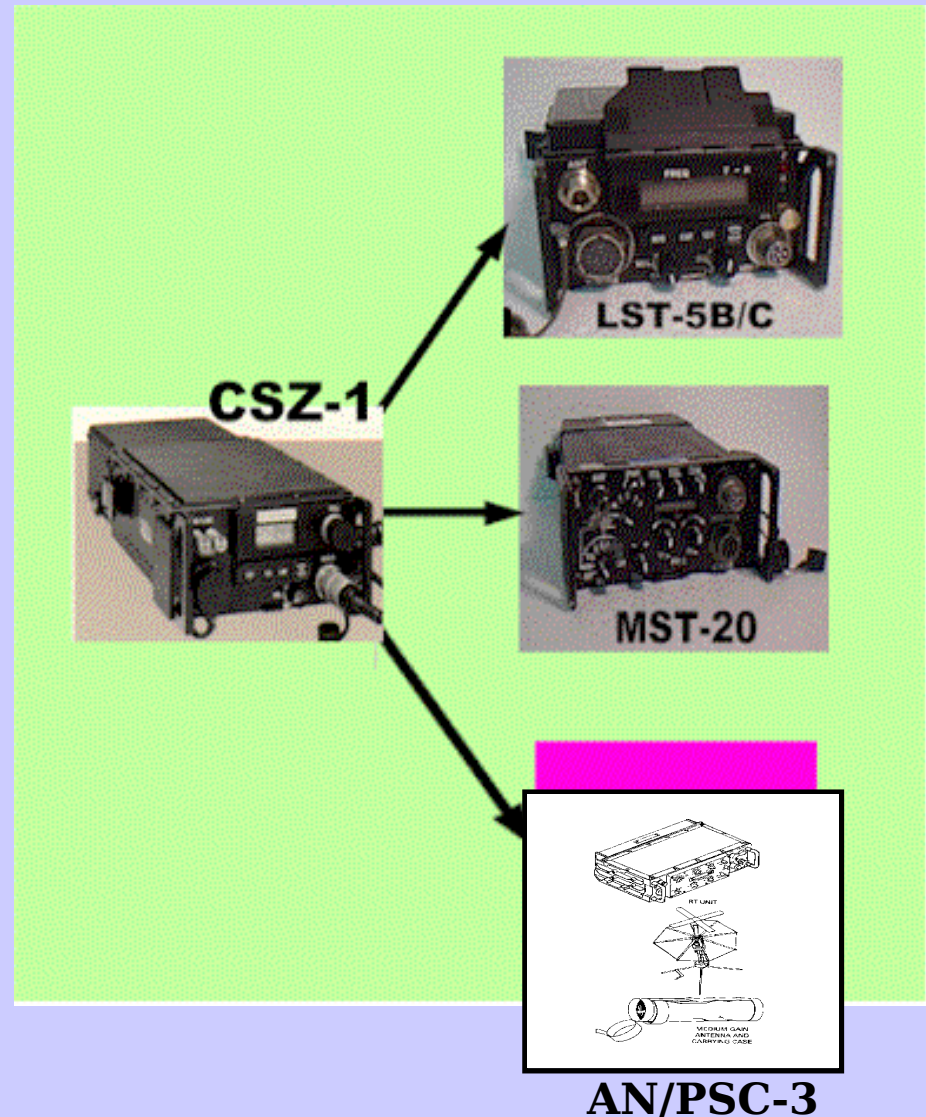
SATCOM

Sunburst Processor

RT	X-MODE Cable
AN/PSC-10 (LST-5B/C)	Tracor # 29357-46338 Motorola # PTKZ- 10430-P27585D002
AN/PSC-7 (MST-20)	CX-12991/U
AN/PSC-3	CX-12991/U
AN/PRC-	NA

177D

- The Sunburst Processor interfaces with these RTs using the same cables as the KY-57 operates in Narrow band (like a KY-99).



SATCOM

Sunburst Processor

(continued)

SUN BURST PROCESSOR	
Setting	Value
RAD-DAT	KYV-5
DATA RATE	2400
KEY POSITION	as required

Radio Settings using the Sunburst Processor (NB)

AN/PSC-10	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	18W
AM/FM	FM
CT/PT	CT
SCN	OFF
BCN	OFF
Modem	ON 2.4
Int Dip Sw	DIFF

AN/PSC-3	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	20W (FCW)
Mode Switch	
Function Sw.	SAT
Call Switch	
BPSK/DBPSK	

AN/PSC-7	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	20W (FCW)
Mode Switch	
PRST/OFS	M

AN/PSC-5	
Settings	Value
Frequency	225 - 399.995
Tx Pwr	18W (MAX)
Mode Switch	
Preamble	PSC-5
Encryption	
Encoding	
Data Rate	
Mode	SATCOM

DAMA SATCOM

LST-5D

- **Interoperability Standards**
 - IAW:
 - Mil-Std-188-181
 - Mil-Std-188-182
 - Mil-Std-188-183

DAMA Modes

PSC-5



Advanced Data Controller (ADC)

- Message Services
- Connects between
PC and PSC-5



Computer Data Controller (CDC)

- Message Services
 - Point-To-Point
 - Selective Destination
 - Broadcast
- PC Software
 - DTS/Win
 - ViaSat eMail
- Connects between PC and PSC-5

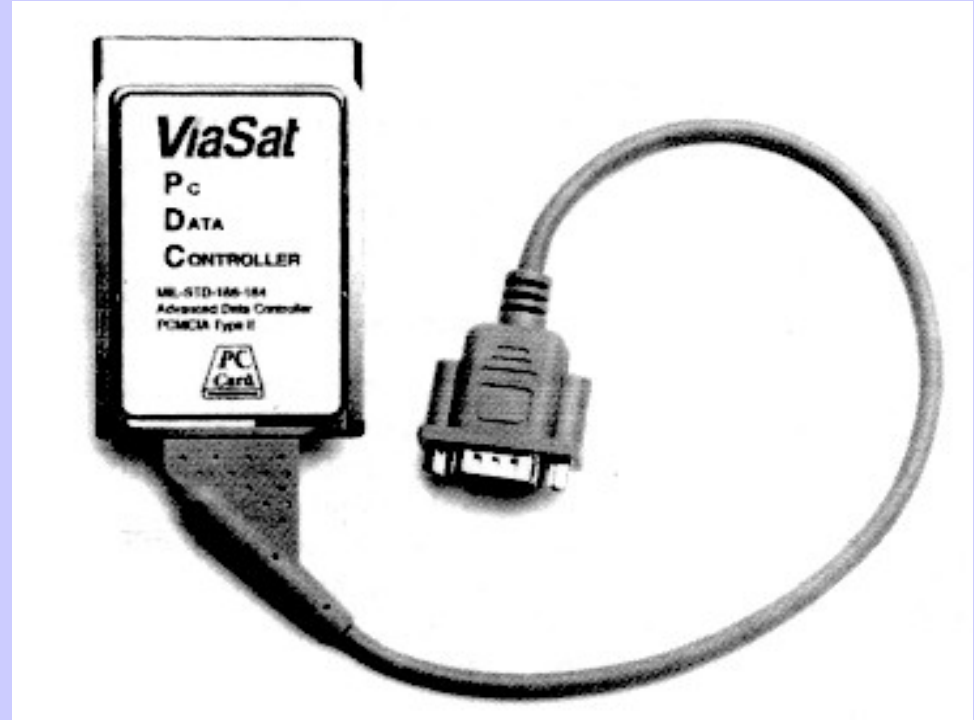


Personal Data Controller (PDC)

- PCMCIA Card
- Similar to ADC
- Software
 - DTS/Win

D2-22

– ViaSat



PDC DTS/Win Configuration

Communications Configuration [X]

☒ **Compression**

☒ **CSMA**

Channel Device: **AN/PSC-5** [v]

Probe Retries: **10**

Burst Retries: **10**

Add'l ACK Delay: **4** secs

Turn Around Delay: **0.0** secs

Max Packets: **256** (per burst)

Tx Start Delay: **0.0** secs

Tx End Delay: **0.0** secs

FEC Code Rate

☒ 1/2

☐ 3/4

☐ 7/8

☐ 1

☒ **Adaptive**

Channel Access Speed

☒ Normal

☐ Fast

☐ Faster

Channel Mode

☒ Simplex (No Acks)

☐ Duplex (Acks)

OK

Cancel

PDC ViaSat eMail Configuration

Communications Configuration [X]

☐ Compression Channel Device: **AN/PSC-5** [v]

☒ CSMA Probe Retries: **10**

Channel Mode

☐ Simplex (No Acks) Burst Retries: **10**

☒ Duplex (Acks)

Add'l ACK Delay: **4** secs

Turn Around Delay: **2.0** secs

Max Packets: **256** (per burst)

Tx Start Delay: **0.0** secs

Tx End Delay: **0.0** secs

FEC Code Rate

☒ 1/2

☐ 3/4

☐ 7/8

☐ 1

☐ Adaptive

Channel Access Speed

☒ Normal

☐ Fast

☐ Faster

☐ Use ALE

Re-Key after **15** mins

Direct Mode Parameters

OK

Cancel

AN/PSC-5 Interoperability

PDC

DTS/Win Configuration

Active Connection	Half Duplex
Participants	Select as Applicable
Drivers	PDC (dts5.dll)

Connections	Small Items Large Items Reliable Items	Message Circuit Circuit
Misc	ADC only Mode Auto Load Windows Placement Zulu time is local+ Packetized files	No Yes ____hrs Deleted
Reliable	Wait ____ seconds for ACK from Recipient Retry a Maximum of ____ times Blocksize	20 10 10K
Timeouts	Pause ____ seconds between transmitting items Pause ____ seconds after receive before transmitting	5 3

Parameter	Setting
ACK Delay	4
Turn-around Delay	2
Compression	On
CSMA	On
Crypto	PSC-5 or KY-57/99
Probe Retries	10
Burst Retries	10
FEC	1/2
Channel Access Speed	Normal
Crypto Mode	Simplex
Baud Rate	N/A
Max Packets	256